s Amelia Earhart Still Alive? See Page 10

POPULAR AVIATION

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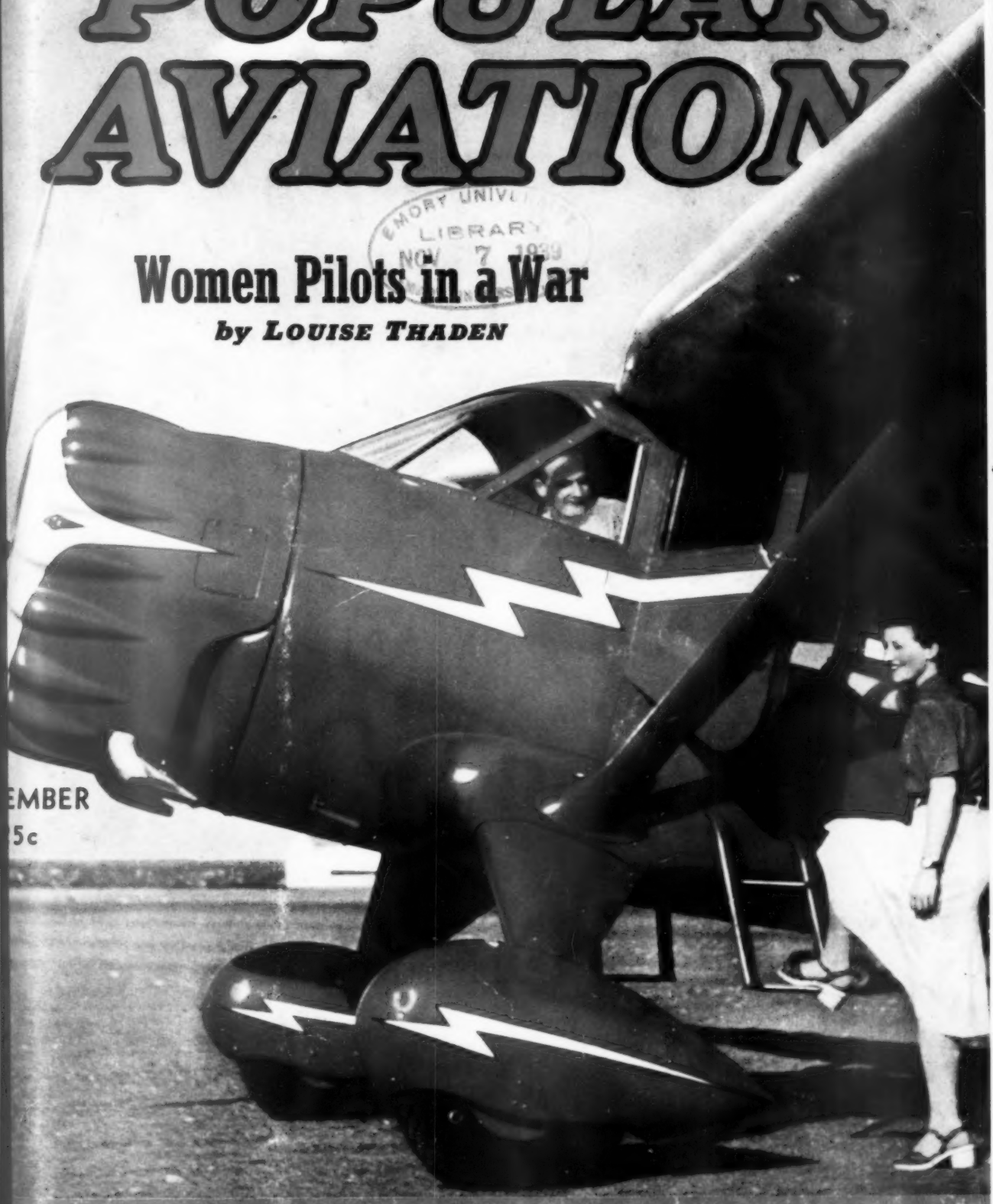
Women Pilots in a War

by LOUISE THADEN



EMBER
5c

top Picking on Us Racers" *says Art Chester*

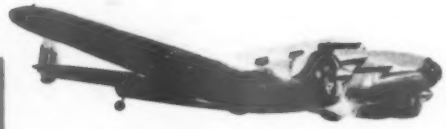
1927 VEGA

1930 SIRIUS

1931 ALTAIR

1932 ORION

1934 ELECTRA



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August 25, 1939

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W. C. Burks, District Sales Manager
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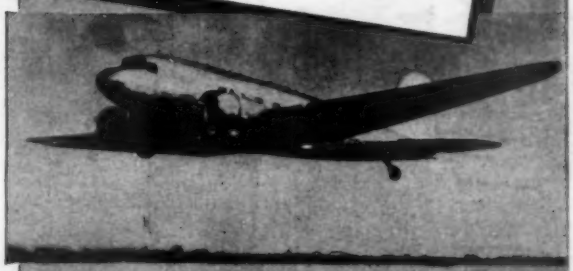

Not only Mr. Burks, but many other Parks graduates as well, are assisting in Chicago & Southern's development. Indicative of their consistent growth and progress, Chicago & Southern Air Lines, "The Valley Level Route" between Chicago and New Orleans, has just ordered six new Douglas DC-3's, the first of which will be delivered early in 1940.

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That's why Gulfpride gives you more lubricating power per drop—more protection for your motor. It's as clean as the old man's pockets.

FOR THE MATH-MINDED

J. L. Centanni, of New Orleans, tied this month's problem to a spare wrench and dropped it from a confusing altitude into T. W. T.'s right-hand desk drawer. Confidentially, we had to use the wrench to help solve it.

A big airport's hangars house 200 planes—some two-seaters and some four-seaters. The total number of seats is 464. How many two-seaters, and how many

four-seaters are berthed on the field?

(We can't forward the wrench to you. But hurry your answer in to "Tattered Wing-Tips" and we'll check it with the official one.)

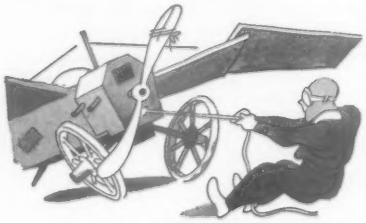
THIS MONTH'S WHOPPER

Dear Wing-Tips:

Here's one I'm swearing to on a stack of fish stories and Chamber of Commerce brochures.

About three years ago I got me one of those little gasoline, washing-machine motors and built me an airplane, using orange boxes, burlap bags, clothes-line wire, and a pair of old buggy wheels.

Well, sir, finishing time comes and goes and then comes testing time. I gets my creation out to the airport, dumps in some ordinary gas, and flips the prop over till she takes. Then when the motor is



warmed up good, I hops in and opens her up. But she won't budge!

I gets out behind and poooshes—she won't budge!

I gets out in front and poooooooolllllss . . . she still won't budge!

After a time she's out of gas so I go over to a different pit and come back with a cupful of G. A. G. 'Course I wouldn't have put in more'n a few drops if I was to foresee the future. But not being a prophet, I dumps the whole cup in the tank and flips the prop.

Well, sir, that plane done the strangest thing! IT JUMPED INTO THE AIR LIKE A SHOT-GUNNED RABBIT AND WAS GONE! Just like that!

That was three years ago and I didn't see hair nor hide of my baby till the other day when I was visitin' around over to the airport. All of a sudden that flying orange crate comes bustin' out of the sky followed by a coupla eagles, a condor, two or three falcons, half a dozen assorted hawks, and the toughest-looking humming bird you ever saw. In no time at all the whole flight banked in to a landing and taxied up menacingly to the GULF AVIATION GAS PIT!

Yes, sir, Major, that truant crate finally run outa' gas and dropped in with the mob for more of the same!

Kenneth Reid

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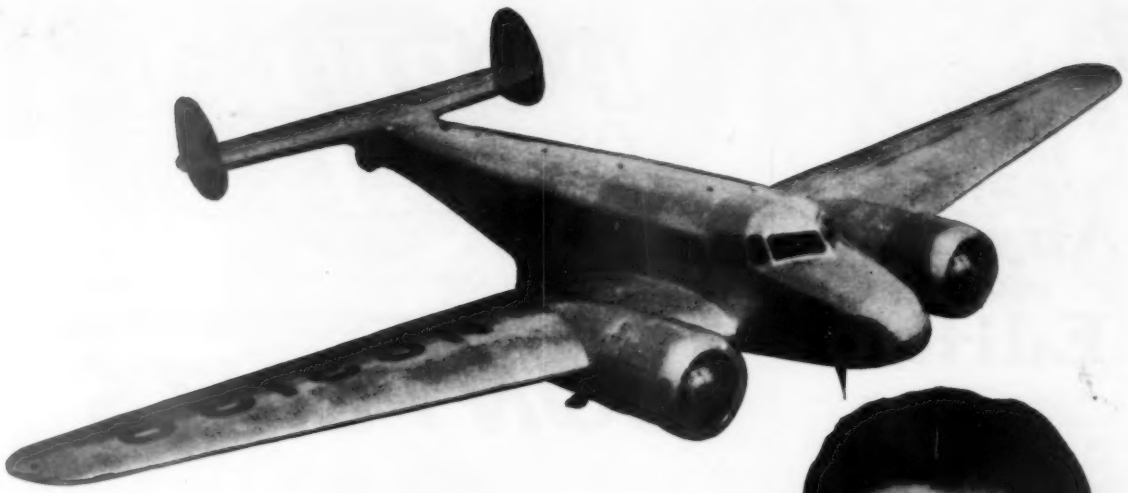

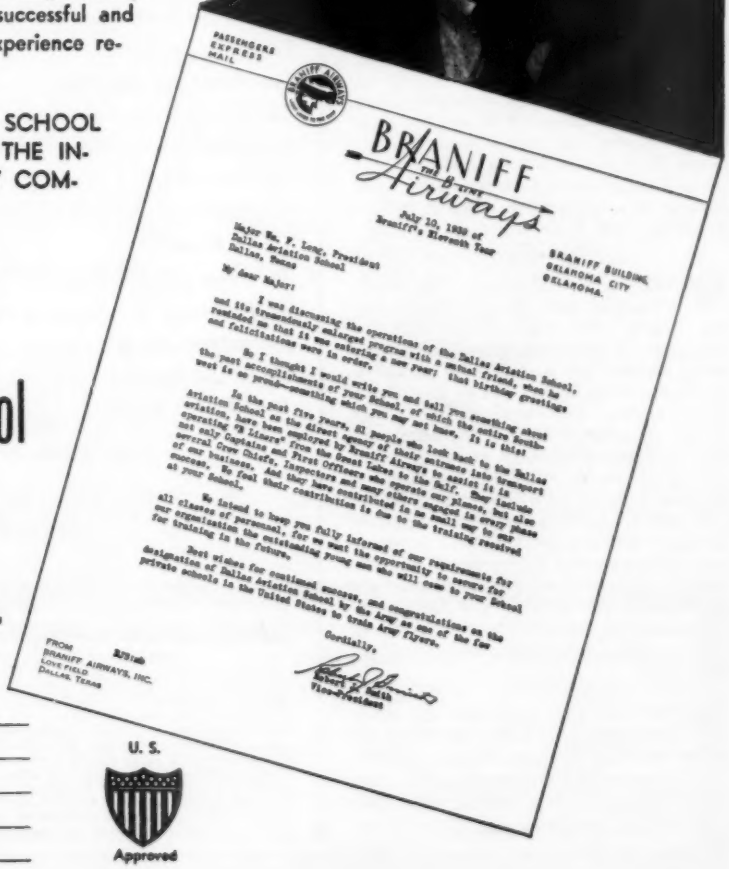

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IN the beginning we hailed the Civil Aeronautics Authority's civilian pilot-training program as one of the finest things done for the disorganized private flyer in many a year. But the basis of that program puzzled us. Why was the free flight training being made available only to college students? We were told that that had been made requisite because of the needs of our military air service for pilots. Inasmuch as the Army, Navy and Marines require all pilots to have a college education (we were told) the CAA could best cooperate by going directly to colleges for prospective pilots. That seemed logical enough until, suddenly, the Army Air Corps turned up with its own civilian pilot training program. Then the Navy expanded its training program. But, as it stands today, the CAA program still is limited to college students. Even worse, the collegians themselves aren't showing the interest in the free offer that was expected. The CAA has done an excellent job so far as its extremely limited program has gone. It can do immeasurably more for aviation in general and private flying in particular if it would now do something for those thousands of young men who think nothing of going without meals to finance the flying time for which they crave.

* * *

WITH the Aircraft Owners and Pilots Association now at work nearby, we are hoping that this already-powerful youngster (2,000 members) will tackle the many pitfalls and hardships so prevalent in private flying today. We've found ourselves mulling over some of the things within the scope of the AOPA: better airport facilities, elimination of tax payment and rebate snarls with every purchase of aviation gasoline, the cooperation of all airlines, necessary improvements in private airplanes and engines, the many unnecessary pilot licensing requirements for the modern, safer private airplane—there are hundreds of constructive jobs for an organization like the AOPA. Private flying badly needs a progressive, unfettered organization.

* * *

WE'RE still waiting for that day when a thousand or two bombers fly to the attack in the current war. Military experts (the "for popular consumption" type) have been forecasting dire things, when this

(*Continued on page* 89)

POPULAR AVIATION

Volume XXV DECEMBER, 1939 Number 6

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This is one of the last pictures of Amelia Earhart and Fred Noonan. Note that map is of course on which they were lost.

IS AMELIA EARHART

THE judge's voice had the tone of unwilling finality:

"With all the evidence before me," he said, "I can reach no other decision. Amelia Earhart Putnam died on or about July 2, 1937. . . ."

And so, in the court of Superior Judge Elliot Craig at Los Angeles on January 5, 1939, ended another tragic chapter in the dark glories of aviation.

Ended? Indeed not! For the very next morning the postman arrived at the home of George Palmer Putnam in North Hollywood with his usual batch of strange letters from psychics and others who said: "She is *not* dead" . . . "I spoke to her last night" . . . "I saw Amelia in a dream." There were more telegrams for a file already choked with some 500 wires. There were phone calls, local and long distance, from persons who challenged: "No court can govern nature. She is still alive."

What is the answer to this mass controversy? Is Amelia Earhart alive? Did she find a refuge on some remote, uninhabited island? These are the questions that emerge from deeply moving appeals —more than 3,000 of them—to Mr. Putnam since America's premier aviatrix vanished with her navigator, Captain Fred Noonan, in the sunlight of a South Seas morning months ago.

Hundreds of writers, asking neither publicity nor reward, insist they have seen Amelia Earhart in their dreams. Many others claim they have talked to her in an astral world. One man in New Mexico insists Amelia told him she was murdered, not drowned. And Mr. Putnam himself, on several occasions, has conversed with weird spirit voices, at least one of which was supposed to be that of his lost wife. All the letter writers ask the question: "Mr. Putnam do *you* believe she is alive?"

Now at last, 20 long months after the disastrous flight, her husband has given the answer he feels deep in heart and mind—an answer echoed by a court of law: "NO."

In that agonizing interval George Putnam has had some of the most extraordinary experiences ever allotted to one

STILL ALIVE?

by DEAN S. JENNINGS

More than two years ago America's most famous aviatrix disappeared somewhere in the vast Pacific. But, even today, there are strange reports that Amelia Earhart still lives. We offer the weird facts for what they are worth.

man in a lifetime. Some of them were uncanny with truth and fact—and without explanation.

He has been besieged, hoaxed, heckled and strangely stirred by thousands of correspondents in every corner of the world. Open-minded, he has attended seances, read horoscopes, corresponded with mediums. He has received rambling messages written by spirit hands; has examined sketches of Amelia Earhart, handwriting, maps—all supposedly emanating from unworldly sources. And once, through one of the cruelest plots ever born in a criminal mind, he was actually convinced that Amelia had been found alive—and brought to New York.

The deluge began less than three hours after that last pitiful radio whisper from a plane floundering in the sky south of Howland Island. The Coast Guard cutter *Itasca* heard that SOS. George Putnam heard it, crouched over a receiver in a Coast Guard station at San Francisco. The whole world soon heard it.

Here is the first telegram, copied verbatim from the original in Mr. Putnam's personal files which, never before shown to anyone, were made available to this writer:

NEW YORK N. Y. DL
OPERATIONS MANAGER OAKLAND AIRPORT.
PLEASE GIVE THIS INFORMATION TO PUTNAM. EMINENT PSYCHIC SAYS BOTH SAFE ON REEF LESS THAN 200 MILES NORTH WEST HOWLAND ISLAND. PLANE PRETTY WELL CRACKED UP BUT BOTH SAFE. MISS EARHART IN BETTER SHAPE THAN NOONAN. ITASCA WILL FIND THEM IN MORNING. HASTE IS NECESSARY BUT THEY WILL BE RESCUED. PLEASE TAKE THIS FOR WHAT IT IS WORTH FROM A WELL WISHER.

The *Itasca* did not find them the next morning. Or the next. Or ever again. But the telegrams and letters and phone calls kept coming. By nightfall operators at the airport telegraph office had stopped sealing the messages; they gave them to Mr. Putnam in bundles. The telephone company installed a special wire. Postmen trudged a weary path to the Coast Guard office and his rooms at the airport hotel in Oakland. Today—more than two years later—those messages are still coming.

In those first anxious hours and days, George Putnam was surrounded by friends and well-wishers, most of whom, openly skeptical, saw something grimly humorous in the flood of bizarre messages. He himself was faced with conflicting emotions—an ingrained doubt of the supernatural, a natural curiosity heightened by grief and worry. AE was down. And any thread was a line of life. . . .

George Putnam tried to answer every wire and letter, tried to run down every meager clue that offered any hope at all. By the end of the third day the task assumed staggering proportions. He had gone without sleep for 70 hours, had taken virtually no food and friends tried to intervene.

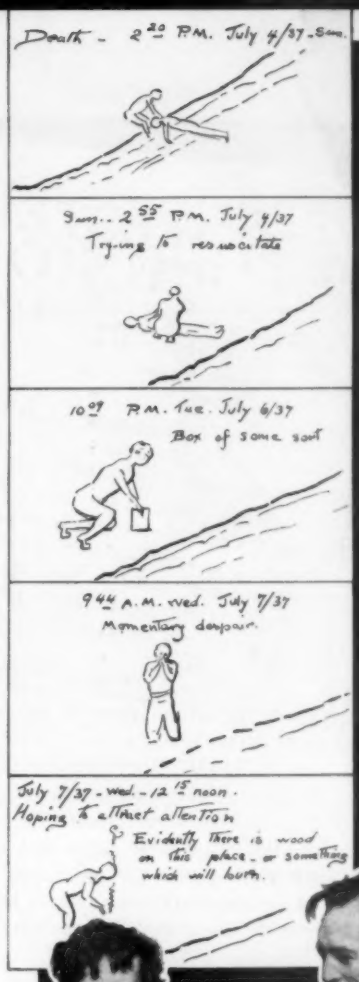
"Now look, George," said Dr. Harry Clay of San Francisco, an old friend, "you can't stand much more of this. And anyway, you certainly don't believe in that psychic stuff."

"Believe?" George Putnam said wearily. "At a time like this, Harry, I'm willing to believe almost anything that might help."

"But those letters are based on dreams. On spook voices. Probably fakes."

"Perhaps, Harry. You're a doctor. You know how close dreams are to reality. And who really knows how to find the dividing line?"

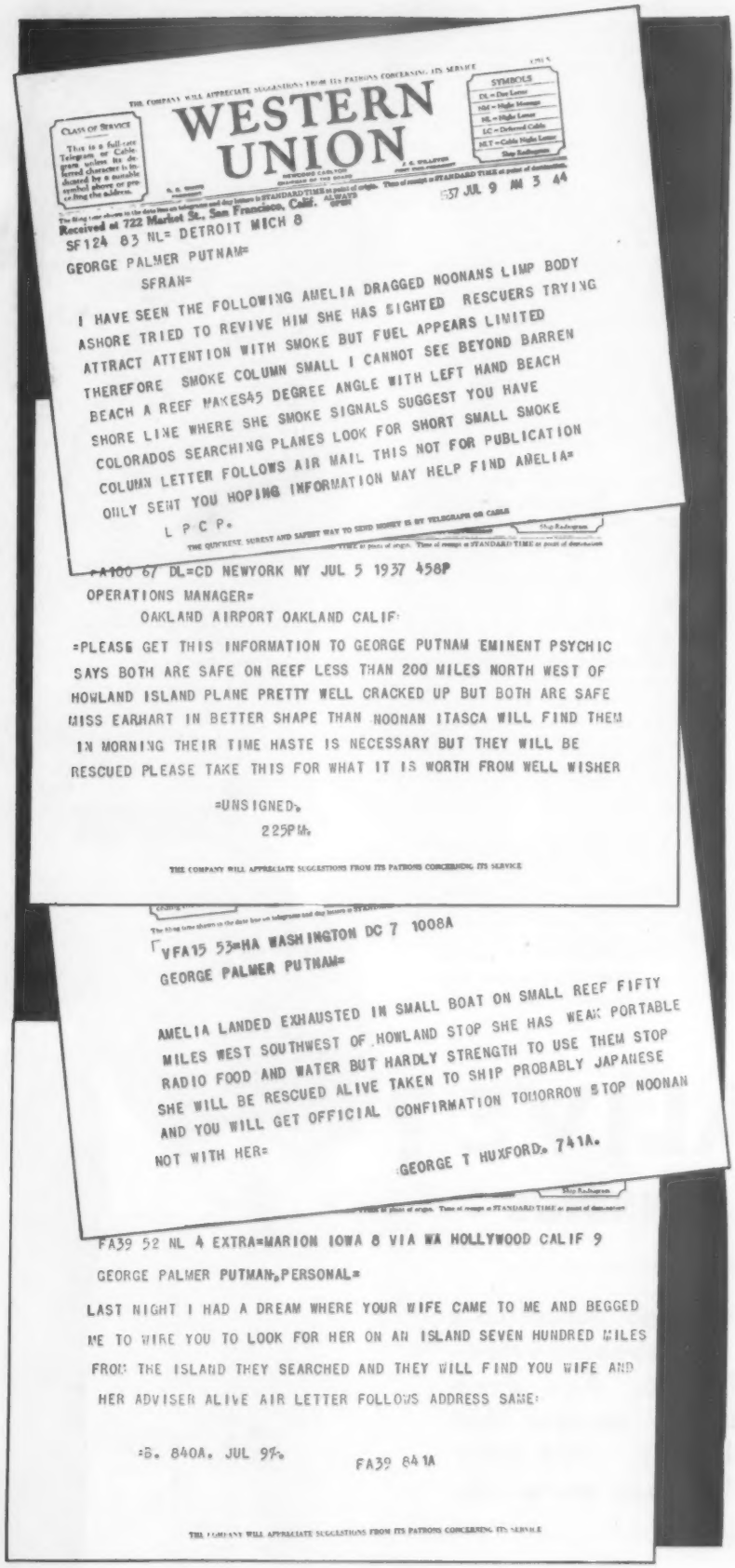
Dr. Clay smiled at his friend and patient.


Death - 2:20 P.M. July 4/37 - Sun.
9 a.m.. 2:55 P.M. July 4/37
Trying to resuscitate
10:09 P.M. Tue. July 6/37
Box of some sort
9:44 A.M. wed. July 7/37
Momentary despair.
July 7/37 - wed. - 12:15 noon.
Hoping to attract attention
Evidently there is wood on this place - or something which will burn.

Above right are "human radio wave pictures" sent to Mr. Putnam by a Detroit woman.

This picture of AE and Noonan was taken shortly before their disappearance on July 2, 1937.

All material used to illustrate this article from George Palmer Putnam.



WESTERN UNION

Received at 722 Market St., San Francisco, Calif. 37 JUL 9 AM 3 44

SF124 83 NL= DETROIT MICH 8

GEORGE PALMER PUTNAM=

SFRAN=

I HAVE SEEN THE FOLLOWING AMELIA DRAGGED NOONANS LIMP BODY ASHORE TRIED TO REVIVE HIM SHE HAS SIGHTED RESCUERS TRYING ATTRACT ATTENTION WITH SMOKE BUT FUEL APPEARS LIMITED THEREFORE SMOKE COLUMN SMALL I CANNOT SEE BEYOND BARREN BEACH A REEF MAKES45 DEGREE ANGLE WITH LEFT HAND BEACH SHORE LINE WHERE SHE SMOKE SIGNALS SUGGEST YOU HAVE COLORADOS SEARCHING PLANES LOOK FOR SHORT SMALL SMOKE COLUMN LETTER FOLLOWS AIR MAIL THIS NOT FOR PUBLICATION ONLY SENT YOU HOPING INFORMATION MAY HELP FIND AMELIA=

L P C P.

THE QUICKEST, SUREST AND SAFEST WAY TO SEND MONEY IS BY TELEGRAPH OR CABLE

Ship Radiogram

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

A100 67 DL=CD NEWYORK NY JUL 5 1937 458P

OPERATIONS MANAGER=

OAKLAND AIRPORT OAKLAND CALIF:

=PLEASE GET THIS INFORMATION TO GEORGE PUTNAM EMINENT PSYCHIC SAYS BOTH ARE SAFE ON REEF LESS THAN 200 MILES NORTH WEST OF HOWLAND ISLAND PLANE PRETTY WELL CRACKED UP BUT BOTH ARE SAFE MISS EARHART IN BETTER SHAPE THAN NOONAN ITASCA WILL FIND THEM IN MORNING THEIR TIME HASTE IS NECESSARY BUT THEY WILL BE RESCUED PLEASE TAKE THIS FOR WHAT IT IS WORTH FROM WELL WISHER

=UNSIGNED.

225PM.

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

VFA15 53=HA WASHINGTON DC 7 1008A

GEORGE PALMER PUTNAM=

AMELIA LANDED EXHAUSTED IN SMALL BOAT ON SMALL REEF FIFTY MILES WEST SOUTHWEST OF HOWLAND STOP SHE HAS WEAK PORTABLE RADIO FOOD AND WATER BUT HARDLY STRENGTH TO USE THEM STOP SHE WILL BE RESCUED ALIVE TAKEN TO SHIP PROBABLY JAPANESE AND YOU WILL GET OFFICIAL CONFIRMATION TOMORROW STOP NOONAN NOT WITH HER=

GEORGE T HUXFORD. 741A.

Ship Radiogram

FA39 52 NL 4 EXTRA=MARION IOWA 8 VIA WA HOLLYWOOD CALIF 9

GEORGE PALMER PUTNAM. PERSONAL=

LAST NIGHT I HAD A DREAM WHERE YOUR WIFE CAME TO ME AND BEGGED ME TO WIRE YOU TO LOOK FOR HER ON AN ISLAND SEVEN HUNDRED MILES FROM THE ISLAND THEY SEARCHED AND THEY WILL FIND YOU WIFE AND HER ADVISER ALIVE AIR LETTER FOLLOWS ADDRESS SAME:

=B. 840A. JUL 9.

FA39 841A

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

These are typical of the thousands of messages sent to Mr. Putnam after AE's disappearance.

"There are some things people shouldn't know. Oh, I know you and AE have sat in on table-tappings and other experiments out of your healthy curiosity."

"With some astonishing results—"

"—and others plainly ridiculous."

"Of course. Someone asked me last night," Mr. Putnam added a little bitterly, "whether AE carried a good luck piece on her plane."

"Did she, George?"

"Certainly not. She said the only lucky charms she wanted were a good engine and a first-class mechanic."

"That sounds like AE."

George Putnam said no more, and walked back to the airport office and his long vain vigil. On the fifth day, when Mr. Putnam was on the verge of a physical disintegration that might have left permanent scars, the wise and determined San Francisco physician saw to it that he found rest. He slept 48 hours and rode the crisis.

Then, with his son David, and others who remained at his side during that numbing period when men and planes and ships searched the south Pacific, he began sorting the messages with a calmer mind. One of them might keep hope alive. . . .

One of the first telegrams, significantly, was from a woman now recognized as one of America's leading astrologers. It was she who had written to Miss Earhart before the flight, counseling: "Flying conditions on the first and *second of July* (italics are the author's) are very good indeed, and this would be an excellent time to make the last lap. . . ."

On July 7, plainly stunned, the noted forecaster telegraphed to Mr. Putnam at Oakland:

YOU CAN IMAGINE MY STATE OF MIND AND I CAN IMAGINE YOURS . . . CONSULTATION OF THREE PSYCHICS SIX ASTROLOGERS SAY ALL WILL BE WELL. . . .

Still later, in a humble and poignant letter that reflected her perplexity, she wrote:

"I don't want to alibi. I have none. I failed in the biggest job I've ever had and there's no alibi for that. About psychics and astrologers, our work has been wrong many times, right many times. That is about as much as one can say for it. It has a long way to go."

In the same mail came a letter from another astrologer, Mrs. K—— S——, gently and wistfully reproving Miss Earhart and Mr. Putnam for having ignored a warning she had given them before the fatal flight. And she was right. Her first letter dated May 7, 1937, was found in the files, and it read:

"I beg of you to postpone your trip . . . you can expect *at best* only delays, obstructions and difficulties, even if you avoid a dangerous crash. Please believe that this letter was motivated by a sincere desire to keep you from possible disaster . . ."

These ironic contradictions were noticeable in all the letters and telegrams that reached Mr. Putnam, first at Oakland, then in his North Hollywood home.

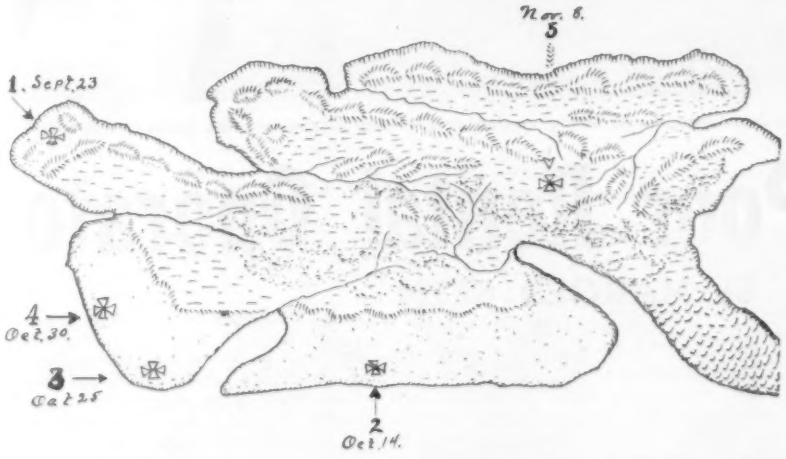
A woman in Detroit sent a series of unique sketches which she called "human radio wave pictures," depicting Amelia Earhart dragging Captain Noonan ashore on a barren island. The woman, an architect with two university degrees, said she was impelled to draw the pictures by a power she could not explain. At the same time another correspondent airmailed a crude pencil sketch which she said was drawn by "the eye of science," moving her fingers. It showed Miss Earhart sprawled face down on a beach, dead.

The messages came from every state, from Mexico, Canada, Great Britain and a dozen other countries. A clairvoyant in Miami "saw" Miss Earhart in a native village at Samoa and asked a reward for her information. Five prominent citizens of Denver "talked" to Miss Earhart in a seance and learned that she and Captain Noonan had been forced down on a volcanic island and were asphyxiated by sulphur fumes. A seer in Boston forwarded a 5,000-word transcript of her astral conversations with the lost flyers.

From an engineer in New Mexico came an incredible account of a dream in which he saw rescue boats approach the wrecked *Electra*. He quoted Miss Earhart:

"We felt no uneasiness, thinking we were among friends. But when our plane touched water, we were shot in the back of the head. Our plane and bodies were rifled of all valuables and the inhuman monsters sank the plane with our bodies."

George Palmer Putnam spent thousands of dollars searching for his wife after her twin-engined Lockheed disappeared at sea. Above, they are planning fateful flight.



1. Sept. 23. I saw Amelia Earheart on a rock near the water, her clothes very shabby.

2. Oct. 14. Talked with Amelia several times, said tell George to come and get her. I don't know who he is

3. Oct. 25. I saw Amelia on sand calling, waving her arms and jumping up and down.

4. Oct. 30. I floated over the island, heard Amelia call from here, but could not see her

5. Nov. 6. Contacted Amelia twice, first time 12:40 A.M. again at 4:00 A.M., she is very weary, she was creeping along like she was trying to catch something

The Los Angeles man who sent in the above sketch said he drew it in the dark. Below map are his comments on "visions" he had in which he saw AE. He couldn't locate island.

The writer offered an explanation for the crime, saying: "This dream was so starkly clear I felt it my duty to tell you. When one considers the pirating done in the past and today with automobiles, trains and ships, it seems entirely reasonable. . . ."

A retired Los Angeles business man forwarded a diary of his spirit talks with Miss Earhart and a detailed map of an island he had seen in his visions. He had drawn it in the dark of night, but was never able to give an exact location.

In looking back through the bright pages of Amelia Earhart's adventurous life, George Putnam remembered something that might have explained the curious fervor of all those men and women who wanted to help in his hour of despair. It was simply that Amelia Earhart herself had a fragile psychic quality, some strange susceptibility to conditions beyond understanding. She rarely mentioned it to friends, never discussed it publicly. But whenever AE participated in mental telepathy or other psychic experiments to further her curiosity, observers were astonished at results. And yet she never invoked or followed the advice of countless clairvoyants and astrologers who besieged her at every stage of her great flights.

(*Continued on page 76*)

A Naval aviation mechanic rented this ship from Speer, landed in high tension wires, ruining the airplane. The mechanic was unhurt.

Pity the Poor Rental Operator

by HAROLD KEEN

Left is W. Arnet Speer, San Diego rental operator described in article.

SMART aleck flyers . . . indifferent instructors . . .

Eliminate these dangerous individuals from the aviation picture and life would be a bowl of three-point landings for all concerned. And not the least of those concerned are the aircraft operators whose viewpoints seldom seep to the surface—the men who rent out planes.

Lost in the publicity limelight of present-day aviation are the pay-as-you-fly boys but, if anyone is in a better position to tell you what's wrong with some modern flyers and the way they're taught to wheel a plane around, trot him out. He'll have to pack plenty of observations beneath his helmet.

Experience—and it often is bitter as well as costly—is said to be the best teacher. If so, the men who, admittedly in their right minds, entrust to someone they may never have seen before a $2,000 piece of flying equipment for a $5 or $10 bill, are highly educated. They have learned some extremely vivid lessons. Among these is the fact that you can't skitter along the borderline of safety regulations and come back grinning. Another is that if you don't know why your plane is liable to lapse into sheer ignorance of your presence at the controls—in a phrase, if you don't know aerodynamics—your days as a flyer may come to an abrupt and unpleasant end.

Catering to the average American flyer who perhaps cannot afford to own a ship but occasionally wants to take some friends up for a ride and a thrill, or the young fellow anxious to accumulate flight hours, or the citizen who finds in flying the exhilarating recreation he can't get on the ground, the rental operator stands in the very center of the

He never knows what the next customer will do with his valuable airplane. Yet this operator rents out his ships daily to pilots who should be capable, but who are liable to try showing off—which then might prove to be expensive.

stream of the nation's private operators. He knows their every peccadillo.

Southern California furnishes a natural setting for the uninterrupted skycavorting of all types of flyers and it is here that some of the nation's largest owners of rental ships are located. Seeking the inside story on just how capable the average amateur flyer is, we cornered W. Arnet Speer of the Speer Flying Service in San Diego, one of the most pretentious rental enterprises in the country.

He has his own airport, Speer Field, with 11 planes on the flying line, ranging from Piper *Cubs* to a 400 h.p. Douglas biplane with a 3S rating. An Army Reserve pilot himself, with commercial ticket and over 2,000 hours to his credit, Speer does a thriving business of more than 400 flying hours a month, year 'round. From his vantage point, he has unlimited opportunity to see the output of flying schools "in the raw" and Speer's experience with private flyers may be considered typical of the "fly yourself" operators.

Although his ships have flown over 12,000 hours during the five years he has been in business, without a single structural failure (and only two forced landings due to minor motor trouble), and minus so much as a scratch for any of his own students or passengers, yet Speer has lost six airplanes, costing him almost $9,000. So he speaks with feeling and authority on the subject of inadequate instruction and foolhardy antics of pilots.

Speer was owner of the airplane which figured in the freakiest aviation accident of the year. He cited it as an object lesson in improperly trained pilots. An earnest young Naval aviation mechanic, holding a private pilot's license, rented a small cabin plane to practice landings on the Speer Field. After an hour, he decided he was coming in too high and too fast. On his next approach, evidently more concerned with his speed than his altitude, he glided into the field about as usual, except that he kept his eye too intently on the airspeed indicator. Meanwhile, he failed to reckon with 12,000-volt power lines which ran along a portion of one edge of the field.

The ship struck the wires at 45 m.p.h., shearing a foot off each propeller blade. Instead of hurtling nose first to the ground with the usual fatal results, the plane slid along the wires a few feet, nosed over slightly, then astonishingly settled back on a precarious "hot seat" in the high tension lines. A shower of sparks enveloped the craft and flames began crackling through the fabric while the pilot, with great presence of mind, crawled out of the cockpit, balanced himself on a wire, pulled hand over hand to the nearby pole and slid down unhurt. He was saved from electrocution by a short-circuit which kicked off an automatic switch in the main power house when the plane contacted the wires, thereby deadening the lines.

Mr. Speer contends that the accident, which resulted in no human casualty—but left him with only the metal skeleton of a plane—would not have occurred if the pilot's eyes had been on the field instead of on the airspeed indicator.

"Suppose you arbitrarily set for yourself a certain speed at which you must approach every boulevard stop in your auto," Speer commented. "That would be ridiculous. The speed should depend on the situation. The same is true in aviation. When an aviator begins to fly mechanically—when he has to scrutinize his instruments continuously—you have a crackup in the making. A man doesn't belong in the air unless he can fly by 'feel' and adjust himself easily to different situations. Good instructors can tell whether the student is flying mechanically or whether he responds smoothly to his particular ship and flying conditions.

"If the student doesn't show that he will at least some day be able to fly by 'feel', as well as by instruments and rules we, as instructors, should inform him of his shortcoming, instead of accepting his money and kidding him along."

Eventually, with such a student, the rental man steps into the picture, leading with his chin. The student rents a plane, checks out satisfactorily and the next moment, when alone, performs like a wooden Indian at the controls. The last act shows the rental man rounding up a salvage crew.

Needless to say, every time a rented plane is washed out the operator, especially if he is not insured, financially is set back on his heels. Every crackup costing a ship means the loss of anywhere from $1,200 to $2,000 to such an operator as Speer, who points out that in this vicinity he would be unable to make flying possible to the average-salaried working man—his major customer—if he carried insurance and had to pay the high premiums. So he must rely strongly on the skill and good sense of the private flyer and the integrity of the man who taught him to handle a plane.

In the last five years, Speer has suffered either complete demolition or major damage to at least six ships. A conservative estimate of their value, after depreciation is considered, shows that his pocketbook has taken solar plexus wallops to the tune of $8,800. He had to sell a powerful lot of flight time to recuperate from these blows. Little won-

(*Continued on page* 68)

These are the remains of a Speer-owned monoplane which had been rented by two pilots who proceeded to strafe fishermen on a small lake. Cost: two lives and one airplane.

FLYING "HIGH"

TRADITIONALLY, men break into aviation in one of two ways. They either are born into it—which is usually the case with the offspring of air-minded families—or after becoming interested and graduating from high school, they go one step further and either at college or a technical institution prepare themselves for the profession.

However, today in New York City there are slightly more than 2,000 boys who are preparing themselves for jobs in aviation in quite a different fashion. What they are doing is majoring in the subject while they still are in high school. When they graduate not only will they have the standard high school diploma but, in addition, they will be capable of going into any factory and taking a responsible position as advanced helper. They will have worked on primary and advanced plane motors. They will understand the theories of flight and of plane construction, have a knowledge of mechanical drawing and their experience will include a practical outlook on rigging.

To the men who entered aviation when a fighting plane was an Army ship wherein the observer carried a rifle, such a state of affairs may seem almost incomprehensible. But incomprehensible or not the aviation annex of Haaren High School has, during the past eight years, graduated approximately 5,000 boys, each

In the engine shop Haaren students have access to many types of aircraft engines.

tudents practice airfoil construction in the wood-
orking shop by building up miniature wing sections.

by ROBERT W. BROWN

High schools throughout the United States might well copy the excellent aviation department of New York City's Haaren High.

of whom was trained in the subjects briefly outlined. The 2,000 boys mentioned earlier are the present enrollees.

The story of this course in aviation, which turns out ground men in what might be termed wholesale lots, goes back to 1926. At that time the principals of the city's high schools met to consider the so-called "problem children" of the city. For months the subject had been growing in importance. It was very clear that increasing numbers of boys and girls were losing interest in school.

From that meeting R. Wesley Burnham, Haaren's principal, returned to his office thinking that in place of a straight academic course the time had come to give the students what they wanted. He said, "Why can't we take a subject in which boys are interested, let them study it and, while they are doing something they like, give them an education?"

Boys, he knew, were admittedly notoriously fond of baseball, football, hockey and other sports. Then too they enjoyed puttering around with chemicals, using a microscope, or working in the physics laboratory. But the schools were already giving students a chance to participate in those activities. Another subject with a wide appeal had to be found. What else did boys enjoy, Mr. Burnham asked himself. Well, they built model airplanes. They wanted to learn how to fly.

"That's it," he decided. "Aviation. We'll teach them all about planes."

At the school when the next term commenced a class of 10 boys who were interested in aviation was formed. There was a single teacher. They had no textbooks. Their equipment consisted only of an old Ford engine and a few tools, but they were eager to learn.

Today Mr. Burnham can tell you little about the early days of the course. He admits that he can't remember everything but, from the brief anecdotes he recounts, one can visualize a hard uphill fight which somehow kept the subject going. It was the first time that any high-school had ever attempted to teach boys anything about flying and it had to pioneer in all aspects.

The course caught on. The classes grew rapidly in size; the old Ford engine was joined by other motors and, in 1930, the school found itself in the enviable position of having more applications than it could handle. By 1931 the aviation course had grown too large to be handled in Haaren's main building, so room was found in an old public school on East 99th Street and the Haaren High School Aviation Annex was officially established.

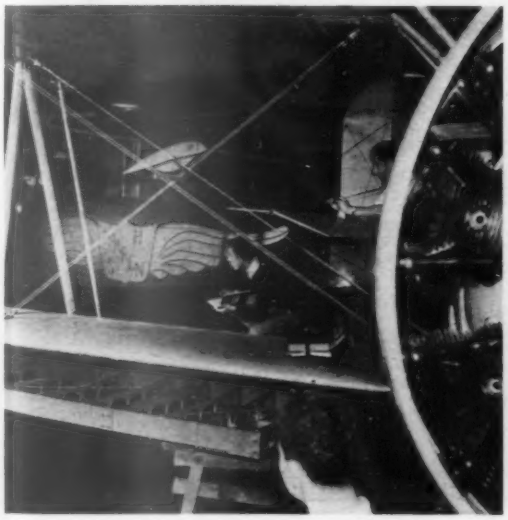
Throughout the years that preceded that change the faculty of Haaren had learned a good deal about teaching not only the subject of aviation but also history, mathematics and English, so that the students would not lose interest. In English, for example, instead of having to read "The Ancient Mariner" and "The Mill On The Floss" students were assigned well-written biographies of famous inventors. When it came to writing compositions they were invited to write upon "How an Airplane Flies" and "My Work in the Machine Shop" in place of the cut and dried—and many useless—subjects active boys have stumbled over for years.

An interesting sidelight is the fact that from this work at least two textbooks have been developed. One, in modern history, approaches that subject from the industrial and mechanical point of view. The other is a textbook for the teaching of aeronautics in high schools. It presents the subject in a manner any boy can understand. At present it is printed in the form of four small booklets, but will soon appear as a bound volume. Additional pamphlets of problems in mechanical drawing, applied science and shop mathematics also have been printed and distributed at the school.

The student who enters the aviation annex of Haaren today will find in the extensive shops more than 50 engines, both airplane and automotive, on which he can work. In addition there are five complete planes from which he will learn the principles of rigging as well as a wind tunnel for studying the elementals of flight. This plethora of equipment has not always existed.

For a number of months, in fact, the course suffered severely from its lack of equipment. The board of education had made no appropriation with which engines, planes or a wind tunnel might be purchased and consequently when it started the school had to rely upon donations. Then in his home one night an instructor was reading the evening paper. In it he saw a headline: "Fifty to Sixty Automobiles Abandoned on City Streets Daily — Sanitation Department Faced with Problem of Disposal".

In this complete airplane rigging shop Haaren students learn to take apart and rebuild actual planes.



There are special classes in aeronautical theory. Here an instructor explains the workings of a plane's controls.

"By George," he cried. "We can use those motors. I'm going to look into that."

The following day he visited the office of the Commissioner of Sanitation.

"Mr. Commissioner," he said. "we need the motors from those cars for our boys to work on. How can we get them?"

"Get them," the Commissioner replied. "You don't have to get them. I've got a crew of men cutting up those cars with acetylene torches so we can sell them for junk. You go up and pick out the motors you want. I'll have the men cut them out for you and we'll deliver them to your front door with a department truck."

On another occasion when the school happened to have plenty of motors on hand but no means of setting them up, a teacher was discussing the problem with his class. "If we only had some angle iron," he moaned, "we could do it ourselves."

All phases of propeller work are taught in this class. Both wooden and metal propellers are in the curriculum.

A boy in the rear of the room arose. "Mr. Smith," he said, "on the way to school I saw an old bedstead in a vacant lot. Do you think we could use the angle iron from that?"

"Johnny," the teacher cried, "you've got it. The class' homework tonight will be to find an old bedstead and bring the angle iron to school tomorrow."

By the next day, the school boasts, every back yard and dump and vacant lot in the city had been scoured for old bedsteads. After a few days' work the motors were in position.

Through contacts made by members of the faculty with men in the Army, Navy and Marine Corps, the school was able in many instances to secure pieces of equipment which, though discarded by the Government, were valuable for instructional purposes and practical work. But fortunately, once the course was started, and its reputation began to spread, many people came to its aid. Manufacturers donated samples of their products and private individuals contributed handsomely. It was from a private manufacturer that the school secured its wind tunnel.

One night, just before closing, the man in question came to Mr. Burnham and asked if the school would like to have a wind tunnel. Mr. Burnham admitted they had thought of getting one, but they had no available money.

"Well," the visitor told him, "if you'd like it I'll lend you one."

Like it? Mr. Burnham leaped at the chance and the man told his story. He was a plane manufacturer about to be dispossessed, but in his Connecticut factory he had a wind tunnel he was willing to lend the school. All the school had to do was to come and take it—that night. Mr. Burnham called the annex. Two of the teachers borrowed a truck, and started for Connecticut. In the morning the tunnel was placed in the basement of the annex with the understanding that whenever the man needed it again he could redeem his property. He has never returned.

In that manner the school secured much of its equipment. Its teachers, all of whom have a sound knowledge of aviation, came to the school under circumstances which though not exactly similar have somewhat the pioneer touch. When the school was expanding rapidly Mr. Burnham said, "Bring me men who know aviation and who can meet the requirements of the board of education. We'll show them how to teach."

As a result, the junior high or grammar school graduate who goes to the aviation annex can be certain that not only will he receive instruction in aviation but, in addition, he will have the advice and help of men who know what they are talking about. Under them he takes a course which is best described by a prospectus the school distributed recently.

(*Continued on page* 84)

One of the most important trades within the aviation industry is that of welder. Haaren students learn this too.

Theory classes deal with basic principles of aviation, including airflow, aircraft controls and elementary aerodynamics.

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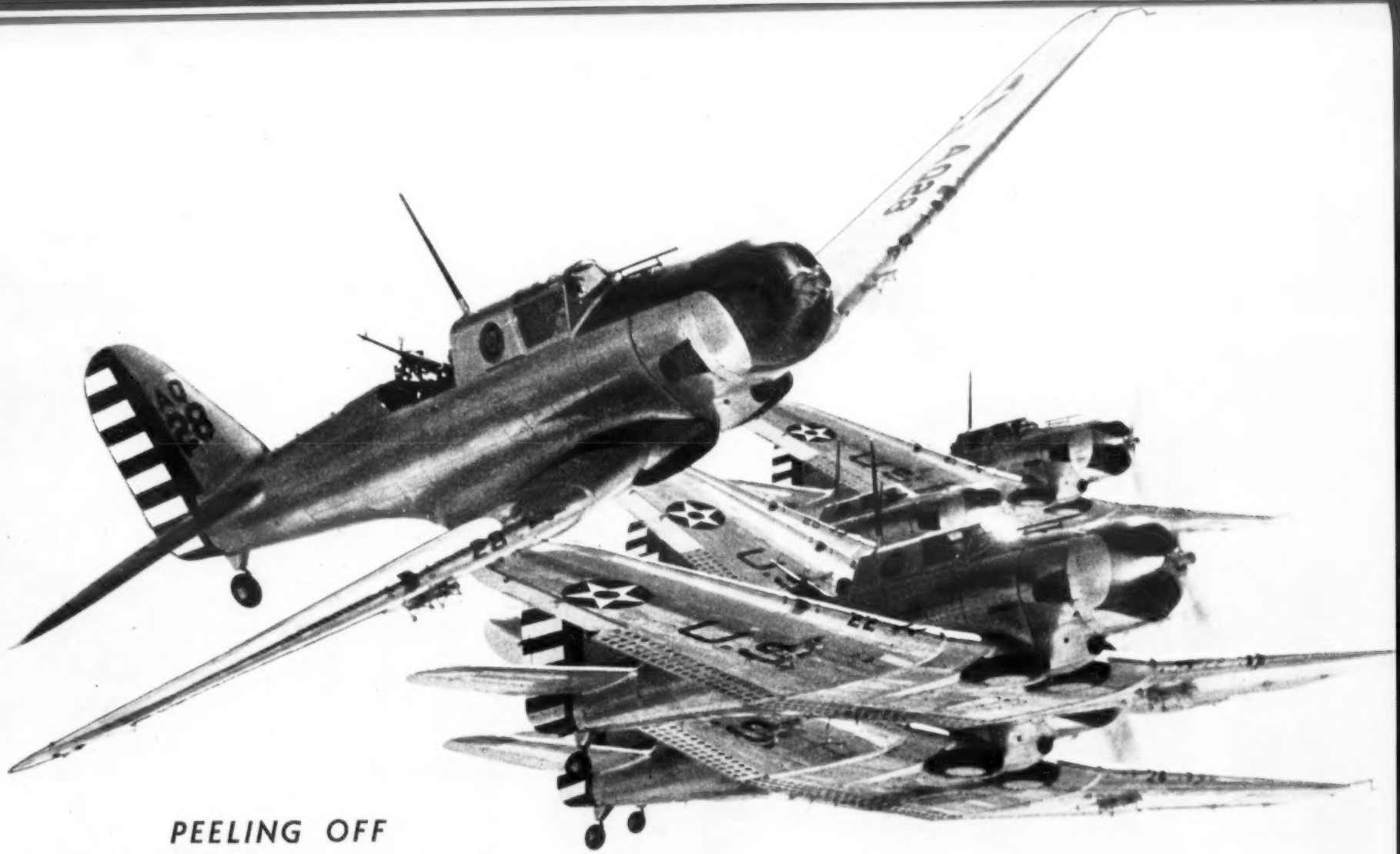


PEELING OFF

Heading earthward, bristling with guns, these Northrop A-17A's of the 17th Attack Squadron, March Field, California, make a startling picture.

Colonel Frantisek Novak (above) is one of the leading Czech aces. He and Colonel Ambruz organized loyal Czech airmen and fled to France upon Hitler's invasion.

WE CZECHS ARE FLYING FOR FRANCE

by Lieut. Frantisek Ribek

One of the strangest articles yet to come out of the war, this exclusive story was smuggled to this country for publication.

Czechoslovakia boasted one of the most

Editor's Note: To the best of our knowledge, events described in this article are accurate. Despite propaganda and counter-propaganda, certain recent official communiques have verified the author's remarks to a surprising degree.

I AM a flying Czech legionnaire. I'm a man without a country but a man with a definite goal. I am out to smash Hitler and the Nazis. With 800 of my comrades I'm dedicated to war until Hitler and the men who surround him fall. At the moment I'm flying as a member of the Czech wing in the French air force and my story here is to tell how 800 Czech pilots and 615 Czech airplanes happen to be pounding away on Germany's West Wall along with the French and English.

It all starts back in my homeland, Czechoslovakia. My father was a farmer. I was interested in machinery. I went to Praha (Prague) and entered a mechanical engineering school. There some of my friends talked to me about aviation and I switched to an aeronautical engineering course. Before I finished my schooling I was enlisted in the Czech aviation corps and was receiving regular flight instruction in a light private airplane.

Along with half a dozen other boys from the same school I passed the proficiency tests that made me eligible for army training. And in the course of time I was turned out, like all the other Czech military flyers, as a full pilot and mechanic. They made us take the mechanic's rating as well as the pilot's rating because Czechoslovakia could not afford to have a big force of pilots and mechanics too. Every pilot had to know how to service his own plane completely —although we seldom had to do all the work ourselves.

I began flying military planes in 1935. I was assigned to a squadron that I will not name here and came to know the two great leaders in our aviation corps—Colonels Ambruz and Novak. Ambruz now is a man of 38 years and Novak is two years younger. They are both great flyers and their influence on me and on most of the other military and

modern air forces among European powers.

reserve flyers in Czechoslovakia has been very great during the crises in all our lives within the last 12 months.

Let me tell you something about these two men. Ambruz's personal history parallel's my own. His family is middle-class. He attended a technical institute and became a military flyer. Early in his course his great natural flying ability was recognized. He completed his training and served with military squadrons for three years. When his superiors believed he had sufficient experience he was placed in charge of all military test flying for Czechoslovakia. It was he who tested every new motor, fighter, bomber, trainer, propeller and flight instrument adopted by our air force.

Colonel Novak is a little younger. His father was a master machinist in the Skoda works. He followed his father's instructions, and went to a technical school. From there he joined the air force, became a master mechanic and finally graduated as a pilot. He specialized in acrobatic flying and soon was chosen to represent Czechoslovakia

(*Continued on page* 58)

Fleeing Czech airmen helped spike excellent anti-aircraft guns (above) they left behind.

Czech flyers also took with them the secret breech plans of these cannon.

Women Pilots IN A WAR

By LOUISE THADEN

Laura Ingalls, veteran flyer, recently was cited by CAA for dropping anti-war leaflets on Washington.

Should this country go to war, woman flyers could—and will—play an important part. A famed aviatrix tells how.

SHOULD a national emergency arise within the next five months, what part will women and particularly women pilots take in the drama of war?

Looking at the situation as it now exists it is improbable that any woman pilot will have part in actual fighting either in the air or on the ground. She may be utilized for ambulance service as she was in the last World War, but this time both on the ground and in the air. It seems rather senseless to use available combat pilots for work a woman of proven capabilities could be used for.

Another use for women pilots, should war come to us within the next few months, would be as co-pilots on our airlines. First pilots will of necessity be kept on because our airlines are the backbone of the nation insofar as rapid communication and transportation are concerned. The majority of first pilots are too old for combat flying anyhow, although the story is decidedly different with second pilots, most of whom are under 30 and fresh from Army schools holding active reserve commissions.

Aside from plane-ambulance and co-piloting on airlines, women pilots could, if necessary, be utilized as primary instructors. Katherine Stinson during the last World War offered her services and was accepted as an instructor, having had as much, if not more, experience in the air than most of the men pilots retained on that basis. On the other side, Ruth Law flew around the country, paying her own expenses, helping raise money for Liberty Bonds—her services as instructor having been politely but firmly refused by the Signal Corps. Why the Signal Corps refused to accept her is still a mystery as she was an excellent pilot with as much experience as Kate Stinson.

Every able woman who can be used will release a more able man for combat. We have all too few men in the air now. Although it is true we have underway an extended training program, the students today will not be competent military pilots before late 1940—and we are faced with emergencies in 1939. Pilots cannot be ground through the mill as in the last World War, going to the front with from 30 to 100 hours of solo time. First line military craft are too fast with too many complicated mechanisms for neophytes. They definitely require experienced pilots not only to get them in the air and back on the ground safely, but the experience which makes the airplane subservient to reactions which allow the pilot to execute maneuvers subconsciously while concentrating on whatever objective is at hand. In this connection I am reminded of a story told by one of our pursuit pilots during the last war who

Anne Lindbergh is a highly proficient pilot, can fly many types of aircraft.

The veteran Ruth Nichols could serve admirably as a wartime pilot instructor.

Jacqueline Cochran is famous for her flights in a standard Army fighter.

claimed to be a German ace because he cracked up four Allied planes and inadvertently shot down another while warming up his guns.

In Russia many thousands of women have been given army training, a relatively large number as pilots and observers, some as airplane mechanics, many more as ground soldiers. It is common knowledge that women in China have materially augmented infantry forces fighting shoulder to shoulder with their men—and as gallantly. Women in Spain helped swell thinning ranks during the recent civil war, plugging many a hole in the line. Gocen Sabihi, a woman, is an officer in the Persian Air Force and is credited with training half the Persian Air Forces' existing pilots.

With present and potential production of our own aircraft factories, it seems probable that aircraft supply will exceed pilot supply. As a matter of fact that condition exists today, if what active Army pilots say is true. Due to the recent expansion program the Army even now has airplanes staked down on a number of fields because there are no competent crews to fly them.

Of course we have a potential reserve of some 18,500 civilian pilots, about 50 per cent of whom would be under the age limit for active military flying. This figure includes about 1,200 airline pilots and a considerable number of pilots who hold both active and reserve commissions in the Army, Navy and Marine Corps. Of the 18,500 civilian pilots only 600 are women. Yet these 600 could give a good accounting of themselves if utilized in proper places.

Outside the imaginative, adventurous youngsters, women of the United States would not voluntarily choose to go to war as combatants. But, should a national emergency arise, they would willingly pinch-hit in any position or job which would fit their capabilities or for which they could be trained.

That women are not totally blind to the possibility of being used should war come to this country is evidenced by the eight-year-old Woman's Air Reserve in California composed of some 45 members, all of whom are pilots of experience. There also is the three-year-old Nurses' Reserve Corps which has done valuable aerial ambulance service. Each member of this corps is a registered nurse especially trained for aerial ambulance work. Organized in southern California by Lauretta Schimmoler, the corps is relatively small in number but with very definite possibilities.

Preparedness, a conservation of natural resources and available man power are the three prime factors governing the success of a prolonged conflict. It seems improbable that air man-power should become depleted to the point of pressing women into such service, but it might be well to consider such a contingency and inculcate in the present preparedness program the training of women pilots for such jobs as they could most aptly fill, i. e., instruction, co-piloting and aerial ambulance. Such a group could be considered as cadets during the period of instruction and placed on temporary reserve status after completion of the course. I have said before and want to stress again that one of our major problems will be to keep open the fast communication and transportation systems linking and holding together our cities and centers of industry. For, in time of war, it is most vital that shipments between parts factories and manufacturers be swift and more important that normal business channels be kept open.

(*Continued on page 70*)

Maxine Howard, wife of Benny Howard, has flown all types, including DC-4.

Louise Thaden, the author, holds a commercial license, now is with Porterfield.

AIRLINER OF 1950

by

HALL L. HIBBARD

Chief Engineer, Lockheed Aircraft Corporation

Six engines, passengers by the hundred, 400 m.p.h. cruising speeds at 30,000 foot levels. That's the cold, calculating planning now being done by American aircraft engineers.

Hall L. Hibbard

JANUARY, 1950 . . . The 75 ton ship, of mid-wing design, carrying 100 passengers, rides high and smoothly at better than 300 m.p.h. above an Arizona mountain storm. The captain reports either verbally or by teletype (or both, for cross-verification):

"Flight Seven to Burbank. Altitude 30,000 feet. Over Kingman, Arizona. Roughness has developed in the outboard port engine. A flight mechanic is making adjustments. Arriving in 45 minutes."

The plane will have either four or six engines, in-line and liquid cooled, built into the wing and accessible to flight mechanics. Passengers will be able to talk by short wave radio to the ground, telling their friends of their arrival. The landing gear, fully retracted, will be of tricycle type. The wings will be comparatively small, because the flaps will have so increased in size that they will be "landing wings." They will have been used in the recent take-off, too, because of their increased lift.

The four or six motors will develop approximately 4,000 h.p. each and possibly more. Baggage will be stowed and some of the crew will ride inside the wing near the root. This will be the beginning of the trend to the flying wing. The passengers will be talking about this flying wing, capable of carrying 150 passengers and cruising at 400 m.p.h. There is a chance that tests will be made in 10 years on the finished wing. If not, leading aircraft engineers will be making mock-ups of the craft, which will retain the tricycle landing gear, which will have lateral stability from its dihedral, longitudinal and directional stability from its sweepback and which will have controls at its wing-tips. Mark that I say the trend will be starting in 1950 and that the flying wing will be with us within the next 20 years, if not in 1950.

This plane for 1950, forerunner of the flying wing, will be marked by no economies in production. It will have come from just about the same kind of an assembly line as we have today. True, there will be more spot welding, bigger dies, more and larger fabricating machines will save labor. But these advantages will have been offset by the new complexities of production. Airliners will not have become cheap over night.

The plane will be of metal. Today, there is considerable talk of using plastics in both fuselage and wing construction. Moulded plastics no doubt will come into increased use in the manufacture of lightplanes as the material is made stronger and weight is decreased. But the airliner of 1950, and those to come after it, will be of metal for strength and safety under all conditions, including fire. There will be lighter and stronger alloys. The airliner will be a little bit lighter and a little bit stronger. The chief obstacle which faces the use of plastics in any but small ships is the necessity for bracing. It would not be practical for our 1950 airliner, for instance, if the long, cigar-shaped fuselage had to be braced internally.

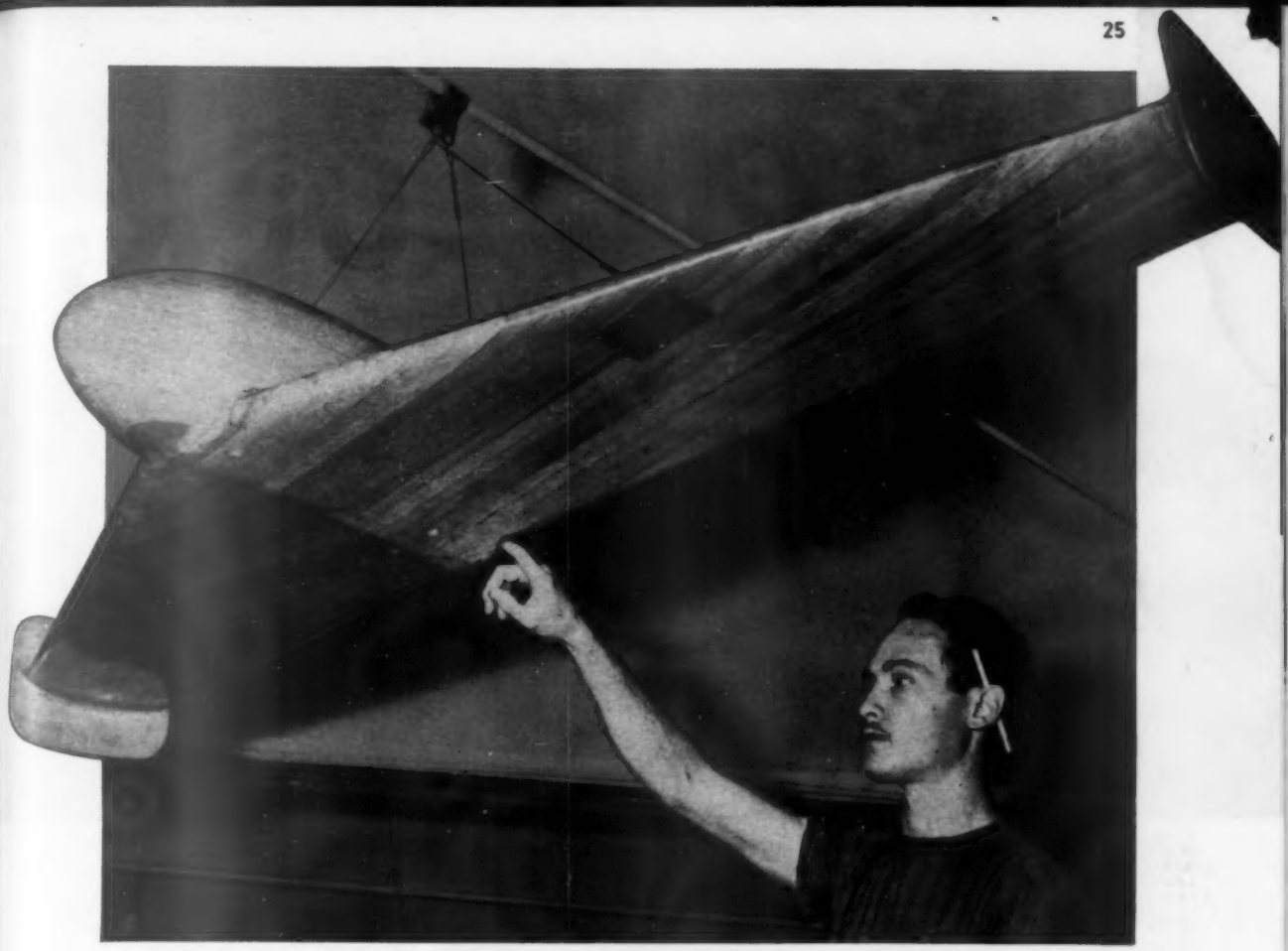
Sub-stratosphere flying will have become so common in 1950 that our passengers will think nothing of it. Today it is a reality. Our present four-motored *Excalibur* (POPULAR AVIATION, November, 1939) will be hermetically sealed, and will be designed to fly at 20,000 feet without inconvenience to passengers. Your airliner of 1950 will have gone to 30,000, and will be coming into Burbank at that level.

As short a time as a year ago, engineers were frightened and mystified by talk of stratosphere flying. The stratosphere was somehow big, forbidding and hard to comprehend. However, we know that your 1950 airliner will be 500 pounds heavier because it will be hermetically sealed. We have found that this sealing is not difficult to accomplish. Exterior plates on the *Excalibur* will be made airtight by painting lapping edges with a new compound, the chief ingredient of which is duprene. Doors are easily sealed tightly through the use of linings. All windows are sealed against weather today with rubber. This practice will be continued, with insulation strengthened and glass thickened. The glass must be thickened to withstand a pressure of four pounds to the square inch, which is approximately equal to the weight of three men standing on each square foot. This, however, is a minor problem. It is safe to say that all pressure challenges have been met and that by 1950 pressurizing will mean nothing to the airline passenger.

The motors of the airliner streaking over Arizona will be in-line, as I have pointed out, because of decreased head resistance due to lessened frontal area and because they will be more accessible to mechanics working within the wing during flight. The radial versus in-line battle has been waging for 10 years and should be settled once and for all within the next five.

I do not arbitrarily set horsepower at 4,000. This depends on the demands of aircraft operators and builders. We know today that engines which are capable of producing 10,000 h.p. can be built. If operators ask aircraft builders for such motors and the builders ask the motor manufacturers—those motors will be forthcoming.

I say that our 1950 airliner has either four or six engines with reason. A peculiar condition exists in the aeronautical industry. It takes us a year and a half to build an airplane. It takes a



A Lockheed engineer points to a wind tunnel model of a proposed super-airliner. Notice that design is a flying wing and that rudders are on wing tips. Elevators would be on trailing edge with ailerons.

motor manufacturer three years to build a motor. If we design a ship to contain four motors of a proposed horsepower we either have to wait a year and a half after our ship is done for that motor or compromise and use, let us say, six of a lesser output in the interim. If such a situation should arise, we'd probably go to six and come back down to four a year and a half later. Experience indicates that four motors are ideal. Two-motored planes will be archaic on transcontinental airlines of 1950, although they still will be used on feeder systems. In this connection, there will be little change in propellers, if any, as they have reached a high efficiency and continued experimentation fails to indicate any radical departure from present practice.

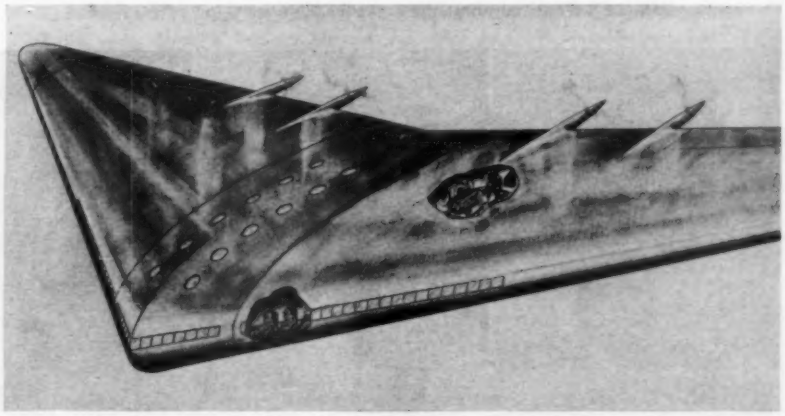
By 1950, at least one auxiliary inboard engine will take the excessive subordinate loads off the main engines. Radio transmission, lighting, instrument operation, landing gear and flap operation and many other functions will be entirely independent. This divorce has already started in four-motored planes.

The tricycle landing gear will be one of the accepted features of our 1950 airliner. This landing gear, as now being used on the Douglas DC-4 and Vega "Unitwin," and other ships, has proved itself conclusively. By 1950 it will be universal. Lockheed is not making over current models, such as the "14" and "16", but the *Excalibur* and all other future ships will have it. The big problem has been braking, with landing gear and linings suffering from undue loads. This has been met. The tricycle landing gear gives directional stability on the ground, allows the use of full braking power without nosing over and permits practically any kind of landing in any wind condition, cross or otherwise.

Very definitely your 1950 airliner will be using 100 octane fuel instead of the present 87 octane. The step-up will take place because of the increase in power and improved performance already apparent.

There will be fixed slots in the tips of

(*Continued on page 72*)



This drawing was made by the author. Note passenger compartments and engine rooms.

TOUGH LUCK,

It was in this Gee Bee racer that Lowell Bayles set a new landplane speed record and later was killed.

"I'LL fly for money, or marbles, or fun," Test Pilot Lee Gehlbach once said, half serious, half joking. That, in a nutshell, tells the story of the plane builders of the past decade who built for speed. More specifically, it's the story of the Granville boys and the men who've worked with them at Springfield since 1929. It's the story of builders of speed and experimental craft, of men with vision and daring and technical skill and a whale of a lot of independence—and, fully as important as all the rest, the stamina to go long months with hardly a bundle of carrots in the vegetable bin.

Go back to that Labor Day about nine years ago at Cleveland. "Speed" Holman flew home the winner with the respectable speed of 201 m.p.h. for the Thompson distance. That autumn the Granvilles had yet to think about racing planes but, within two years, their Gee Bees would have raised the Thompson record by 50 m.p.h. to a point where speed racing would have to wait for Michel Detroyat and '36 for a new Thompson time.

Today, as the Springfield outfit pulls belts a notch tighter, there is confidence that a new racer could be built which would add a cool hundred miles to the '31 mark set by Lowell Bayles in the *City of Springfield*.

Going back 10 years, one finds the Granville boys, led by Zantford the eldest, coming to Springfield from New Hampshire after a try at the automotive business in Boston. There were Mark and Tom and Ed and Bob, five young men who wanted to build aircraft. Not speed planes, but jobs for private flyers.

With the backing of the Tait family, they set up business on the edge of the Tait-owned Springfield airport in a shop remodeled from a dance pavilion. Within a year the Granvilles sold about a dozen private planes, fast even by today's lightplane standards. By the spring of 1931 they were doing well. Their *Senior Sportster* was entered in the All-American Air Derby. Lowell Bayles, a Springfield flyer, piloted the stock-built craft throughout the tour, finishing second only to Lee Gehlbach in a specially-built racer.

That was only eight weeks before the '31 Thompson at Cleveland. Robert L. Hall was then chief designer for the Granvilles. Just as inventive and fiery as the brothers with whom he worked, he was blessed with an inspiration and hammered it into reality before it could escape. Working like mad, and without previous

Mark Granville

Donald DeLackner

Howell Miller

Russell Thaw

The Story of GEE BEE

by WALTER T. BONNEY

Closely interwoven in the history of speed flying in this country is the name Granville. These five brothers became famous for their work but were constantly dogged by misfortune.

INC.

experience, the outfit built a speed plane for the Thompson. Often Hall was but a step ahead of the boys in the shop with his plans and stock was sold in the Springfield Air Racing Association hardly fast enough to pay for incoming materials. All this struggle was based on the theory that the Springfield ship would naturally win the race, and pay back the stockholders, out of prize money!

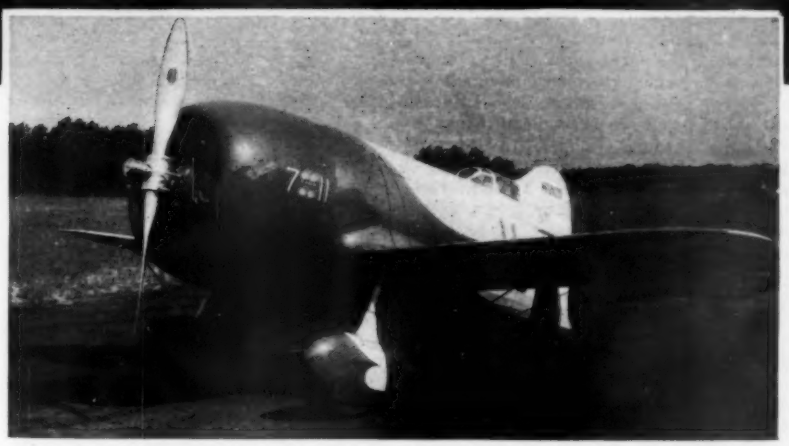
Fitted with stubby wings, the *City of Springfield* had a huge—so it seemed then—cowling around the *Wasp, Jr.* Its black and yellow trim made it look even tinier and faster. The cockpit was small, even for slight Lowell Bayles, and outside bracing had been kept to a minimum. The result was a beautiful piece of streamlining.

Off to Cleveland went the Springfield entry and, just as if it had been scheduled, Lowell Bayles made good. Flying an ice-cool race, he whipped around the pylons without an extra foot of skid and lapped all competitors except Jimmy Weddell before he finished with an average speed of 236 m.p.h.

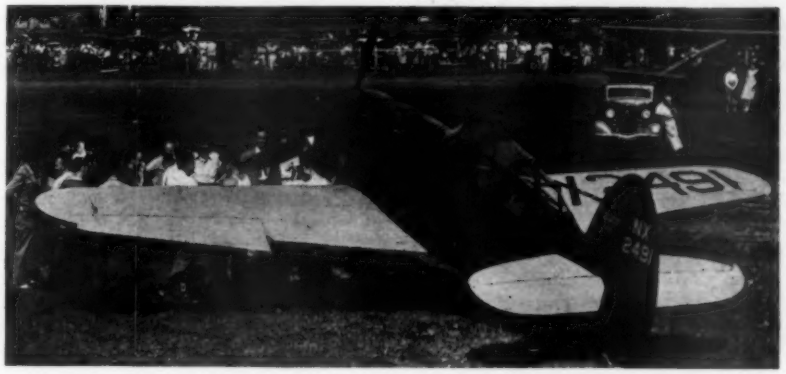
Bayles wasn't the only Springfield pilot who was successful that year. Flying the *Senior Sportster,* Maude Tait won the Aerol Trophy race and then went after the world's record for women flyers. The fact that she missed beating Ruth Nichols' mark by the required five-mile margin detracted little from the enthusiasm aroused by the other victories.

Still hungry for speed, the association decided Bayles should crack the world's

Jimmy Doolittle



Jimmy Doolittle set speed record with this Gee Bee. Note early controllable propeller.



Above military ship was evolved from Frank Hawks' old "Time Flies", crashed later during tests. Below is Sarabia, Mexican ace, and Q.E.D. in which he was killed.

record for landplanes. After some experimentation the *Wasp, Jr.* was taken out and a heavier engine installed for the onslaught against the 278 m.p.h. record. Late in November, at Wayne County airport near Detroit, Bayles piloted the Gee Bee to an unofficial speed of 307 m.p.h., but something had gone wrong with the timing apparatus and the work had to be redone.

What happened December 5, 1931, never will be known. Bayles dove for the 1.8 mile measured course and was flying at an altitude of less than 200 feet at a speed approaching 325 m.p.h. Suddenly the *City of Springfield* seemed to explode and wreckage was strewn for hundreds of yards.

The death of Lowell Bayles failed to discourage the association. Prize money won at Cleveland permitted payment of a 100 per cent dividend to stockholders and more successes were ahead. Because Russell Boardman—who, with Johnnie Polando, had set an international distance record by a flight to Turkey—had become interested in Springfield planes, not one but two jobs were to be built in 1932.

At about this point in the history of speed racing in Springfield, Hall left the Granvilles and began designing planes across the Connecticut river at Bowles airport. There he built two planes, one for a wealthy sportsman named Lynch and the other, a radically designed gull-wing job, for Russell Thaw who was being sponsored by the Guggenheims.

When Thaw decided not to fly the craft in the Thompson, Hall himself piloted the gull-wing in the race. The fact that he finished behind both Granville-built planes in that race must have been a bitter disappointment to him, as the decision to leave the Gee Bee company had been made in anger. At present Hall is with the Grumman company and now is on the best of terms with the Granvilles.

With Boardman's backing, the Granvilles built two jobs in 1932. One, No. 11, was to win the Thompson and shatter the world's speed record. The other, No. 7, was to capture the cross-country Bendix, then win a portion of the Thompson prize money. Hardly more

Earl Ortman bailed out of military version of "Time Flies" during test flight.

Russell Boardman backed building of two Gee Bee's, later was killed during race.

than stubby fuselage stuck behind powerful motors, these red and white ships were beautiful to look at.

Although he had intended to, Boardman didn't pilot No. 11. While making ferry hops in a lightplane he cracked up and spent weeks in the hospital. Jimmy Doolittle was chosen to fly No. 11 and Lee Gehlbach was named second pilot. In the Bendix, Gehlbach flew a plucky, hard luck race to win a minor prize. Almost from the west coast takeoff, he was bothered by cowling and oil line trouble, but he brought No. 7 into Cleveland notwithstanding.

Even though competition was tough, Doolittle had the Thompson pretty much to himself. He flew the 100 miles faster than Jimmy Weddell could negotiate 90. Gehlbach finished fourth with Hall riding fifth. Besides winning the Thompson, Doolittle set a land record with an official speed of 296 m.p.h.

Hall's design of the *City of Springfield* pointed the way to the teardrop principle carried through by Howell W. ("Pete") Miller. Although the Granvilles never produced quantities of private or military craft, the natural curves of the teardrop which they pioneered have since been widely copied in fighting planes and it was at Springfield that the shortened, fattened fuselage was first successfully built behind a carefully cowled radial engine.

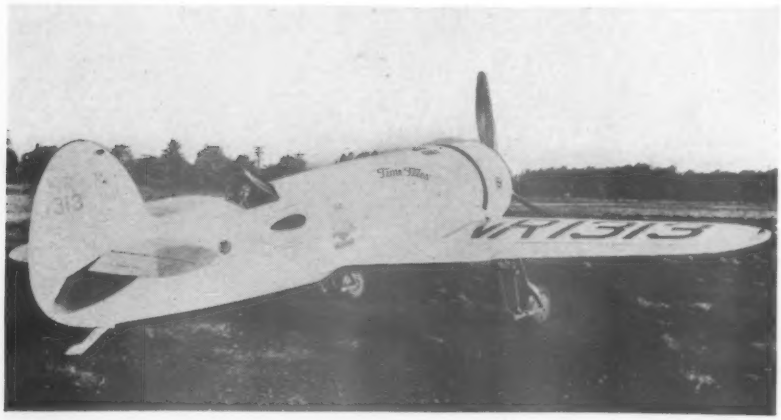
Wing spreads on Springfield planes were considered scandalous by many "experts", but here again the practice pioneered by the Granvilles has been adopted elsewhere. Flaps and other devices developed in the decade have cut landing speeds and quickened take-offs, but many principles incorporated in present-day aircraft were envisioned and made workable over Springfield drafting boards.

Beginning in 1933, the Springfield plane builders faced a period of ill fortune. Fitted with new wings, the "11" was made ready for Boardman to race in the Bendix and Thompson, this year on the west coast. The "7" also was groomed and Russell Thaw was chosen as second pilot.

Next to the last to start from Floyd Bennett on the Bendix was Thaw, and Boardman was last because he had to fidget for hours as mechanics sought to cure shock strut trouble. Boardman's first stop was at Indianapolis When he came in he found Thaw already there, with a wing tip of the "7" slightly damaged. Thaw refused to continue the race so Boardman sought to take off again. As he shot down the runway, he lifted the throbbing "11" into the air without sufficient forward speed. Torque and a sudden gust of cross wind tipped a wing and the "11" crashed, fatally injuring the pilot.

That same spring, the Granvilles began building a freighter-transport twin-motored craft, for use in Canada. By the time they had covered the giant wing with plywood, the bank holiday tied up their backer's money and the project was junked. The next winter, Zantford Granville flew south. Coming in for a landing, he discovered too late that clusters of federal project workmen were on the area. His speed was gone and he was unable to avoid a fatal crash, deliberately invited in a successful effort to avoid hitting someone else.

Frank Hawks' "Time Flies" was one of the most beautifully streamlined ships ever built.



Latest design produced by the Springfield group is this unusual twin-engine, tricycle-geared "Moonship" for feeder services. Engines are 125 h.p. Menascos, will be replaced with Ranger 175's.

After months, when it seemed the Granville organization would have to collapse, Jacqueline Cochran—just beginning her career as a speed and distance flyer—ordered a job that could be flown in the MacRobertson London-Melbourne race. The result, constructed in the spring and summer of 1934, was the Q.E.D. Built with flaps and carrying nearly 500 gallons of gas, it was no racer. Rather, it was a distance plane, built for hard service.

Not until the last minute did Miss Cochran decide in favor of the Q.E.D. over a Northrop *Gamma* she had also bought. She took the Springfield plane to England, with Ed Granville going along to complete minor adjustments. British observers dubbed the Q.E.D. clumsy in appearance but fast looking, nonetheless. Although Miss Cochran failed to finish the race, her flight across the Alps to Bucharest showed the Q.E.D. to be extremely fast and, if she had been able to keep going at that speed, she would have won hours ahead of the field.

After that the Q.E.D. was flown but little until 1938. Last year George Armistead entered the plane in the Bendix, but was forced out by oil-line trouble. Soon after Charlie Babb sold the plane to Francisco Sarabia, Mexico's Lindbergh

When Sarabia flew to New York—non-stop from Mexico City to break the record—he was so enthusiastic about his ship that, when he learned the Granville organization was still in business, he offered the Springfield boys the opportunity to go to Mexico to establish a plane-building industry for his government.

Senor Torres, Sarabia's business adviser, was present when Miller and Mark Granville declined the offer, because they wanted to stay in the United States. In seeking to interest the Granville organization, Sarabia had been after a company which could build wood and tubing craft better able to withstand tropic conditions than all-metal planes . . .

Sarabia's death in the waters of the Potomac has been variously blamed on alleged danger spots in the Q.E.D.'s design. But the facts remain that a rag in the manifold—probably stuffed there to hasten the engine's warmup—was given as the official reason for the accident. Sarabia had called the craft the best he ever flew.

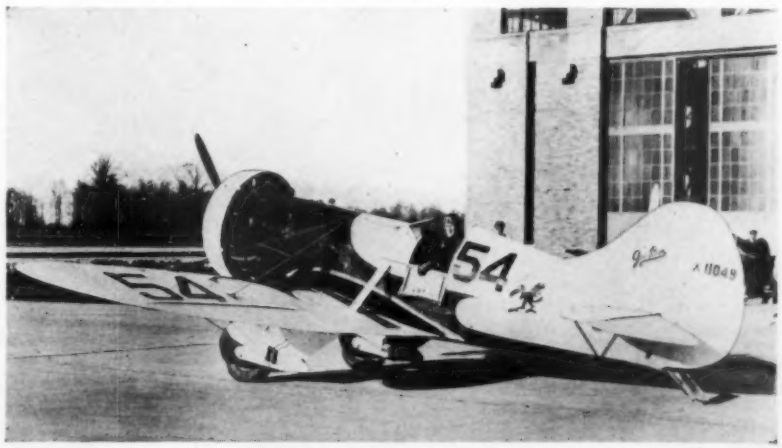
Going back to 1936, the Springfield builders received an order from Frank Hawks to build the fastest landplane ever. This assignment came after a year of inactivity, and the result was *Time Flies,* just about as perfectly streamlined a plane as ever flew. All outside objects which might cause drag were removed. Even windshield resistance was eliminated, through development of a cockpit seat which would raise and lower. During take-offs and landings, the seat was high enough to permit complete forward vision, and the cockpit cover in this position was pushed upward to form a windbreak. Once the plane was high enough in the air to make traffic problems nil, the pilot lowered his seat 12 inches. The windshield dropped at the same time to form an unbroken fuselage line from cowl to tail. Much the same arrangement has since been incorporated in the design of the British-built Miles *Master.* The raising agent for the seat and cockpit was a chain-store hydraulic jack of the type used on an automobile and selling for about $3.

By October, 1936, test flights were scheduled. Twice Hawks had trouble with the plane and both times the failure was due to causes which can't be blamed against either craft or pilot. The first time, a fur-lined mitten dropped between the worm gear of the retracting landing device and, when Hawks came down, his landing wheels weren't in full position. The gear was washed out, although the craft didn't suffer a scratch on wings or fuselage.

Again, Hawks took off on a non-stop dash to Miami. On the way down he bucked strong head winds and missed his mark. On the return the winds had shifted and again he had to fly slower and burn more gas. By the time he reached Newark it was dusk and he brought *Time Flies* down in a hurry.

(*Continued on page* 85)

Maude Tait of Springfield flew this "Senior Sportster" in several women's air races.



Mr. and Mrs. Chester share an equal interest in the famous Chester "Goon" racer.

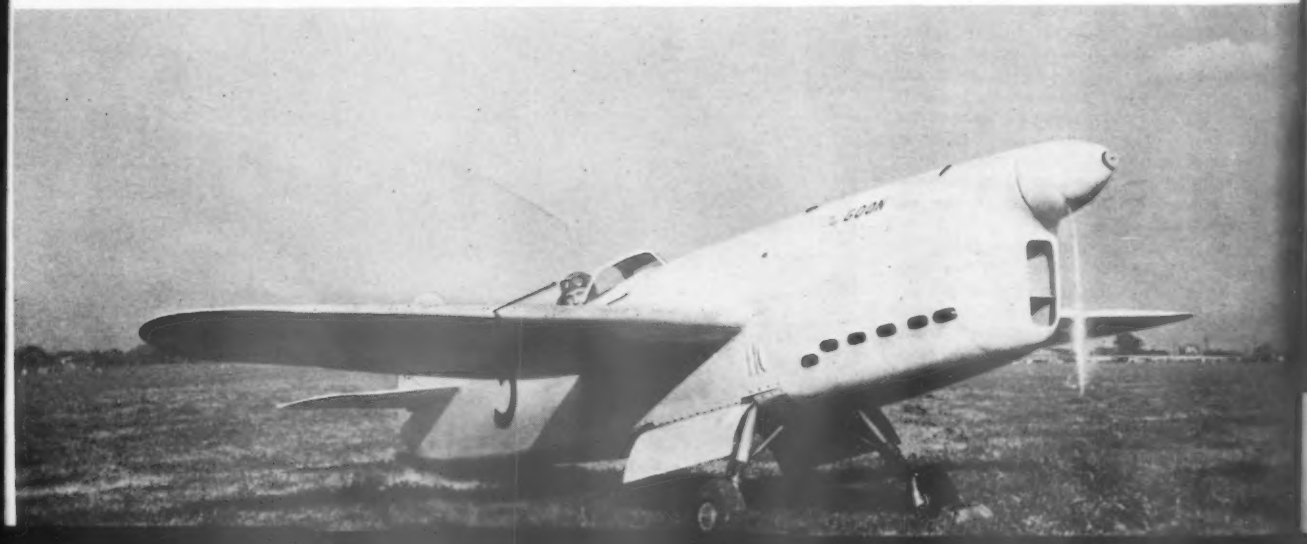
★

Probably the fastest racer in its class, the author's "Goon" holds several records.

STOP PICKING ON US RACERS!

Says

ARTHUR C. CHESTER



One of America's leading racing pilots has a few things to say in defense of his profession. He contends that racers have done much toward the improvement of aeronautical technique in general.

JUST before the National Air Races each year, there is a pilot's meeting. The opening shot at this meeting is usually something like this:

"Boys, this is going to be the meet that will determine the future of air racing in this country. There are some who claim you contribute nothing to commercial aviation, the CAA has a critical eye on you, you have two strikes on you already and one slip on your part, one infraction of the rules or one spectator hurt and air racing is done for!" or words to that effect.

As a race pilot, I am tired of being on the defensive, tired of being threatened, intimidated and scared into believing that air racing has no rightful and useful place in the aeronautical picture in this country. The National Aeronautics Association, which is the governing body for competitive events in this country and professes to be looking out for our interests, has been asking us to give them some good, sound arguments they can use to prove that air racing has served some useful purpose. Whether the following arguments serve that purpose or not, they are the sentiments of one who has been racing for 10 years—and they do help get a load off my chest.

First of all, why all this antagonism towards air racing? Is it true that the CAA looks with disfavor on racing? If so, why? We race pilots try hard to stay within the CAA rules and, to my knowledge, there have been no flagrant or intentional violations of these rules. There has not been a single spectator hurt by a civilian racing plane in years of racing. It is true that we do have crashes—fatal ones too—but the number is not out of proportion in view of the highly experimental nature of most racing ships and the abuse to which they are put.

Why are the commercial interests in aviation bucking racing? We are told that manufacturers and especially the airlines would like to see air races abolished, apparently because of the unfavorable effect a crash in full view of the public would have on their business. It is my contention that the public is not so unthinking as to let a racing plane crash scare it out of flying the airlines. If seeing big headlines and pictures in the papers of an airliner splattered against a mountain top does not scare the layman from flying, the lines have nothing to fear from racing, even if all the race ships pile up in front of the grandstands.

Why must air racing justify its existence by contributing something to commercial aviation? Why can it not be conducted as an attraction or amusement, the same as horse racing, speedboat, auto or yacht racing? Many thousands of dollars are spent in building yachts, for instance, to compete in the annual yacht races and, although I fail to see where it contributes anything to commercial navigation or is of public benefit, it is looked upon as a perfectly good and sensible sport—which it is. Air racing is certainly more spectacular and thrilling and, with the ever-increasing speeds obtained and with more ships competing, it will be even more so. If racing ship owners and pilots were not so harassed, there would be more of them, competition would be keener and the races better.

Above is the author with "Jeep", his first racer. Both Chester racers used Menascos.

However, I claim that air racing does contribute to the development of faster airplanes. Manufacturers claim they derive nothing from races. Certainly if you put nothing into it, you derive nothing. Admittedly, racing has not contributed as much as it might have for the reason that, for a good many years, all special racing ships in this country have been built by private individuals like myself and financed by their own rather meager funds. We depend, in part at least, upon prize winnings for our livelihood and if we do accidentally stumble onto something that will enable us to fly five or ten miles an hour faster, we are not inclined to broadcast it to an unsympathetic industry. Despite this, some builders have taken a small four cylinder engine, nor-

(*Continued on page* 64)

Most famous "backyard" racer is S. J. "Steve" Wittman. His highly successful racer is made of old plane parts.

"I'M IN THE ARMY NOW..."

By
WILLIAM E. ZINS

Above is a detachment of the San Diego cadets. Note goggles on necks of "dodoes."

A flying cadet at one of the Army Air Corps' Nine Little Randolphs tells his story. Hundreds of pilots are learning the same way.

"WHY do you want to get into the Army Air Corps?" In June, 1938, this question was asked of me by the Air Corps examining board at Wright Field, Dayton, Ohio. There were a million and one answers in my mind, yet words failed me momentarily. I had looked forward to this day ever since I graduated from the university of Cincinnati as an aeronautical engineer. Randolph Field, Texas, "West Point of the Air", would be, I thought, a perfect place to continue my aeronautical education and it seemed that I was about to make the grade.

Before receiving the board's final okay, they certainly found out what makes me "tick" and why. After eight different eye tests, I realized that "20-20" eyes were essential. And, being a "shorty", I made the minimum height of 5 feet 4 inches by virtue of the most erect position I have ever attained. In other words, I had to pass one of the most strenuous and complete physical exams known. In addition to the eye test, there was the well-known nose, ears and throat inspection to determine their perfection. Normal pulse rate, perfect balance, no deformities and numerous other physical qualities are required. Educational requirements are at least two years college or its equivalent. The age limits are between 21 and 27 years.

A month later I received notice from the office of the Chief of the Air Corps that my name was placed on the eligible list in Washington, D. C. All I had to do now was to sit back and wait for my appointment. And what a wait I had! Having been raised in Cincinnati, Ohio, it wasn't hard to obtain jobs while I waited, but they weren't what I really wanted. I grew restless, and when the

An Army Stearman PT-13 trainer.

These are recently-completed barracks at San Diego. City proper is few minutes away.

Technical ground instruction includes testing several aircraft engines on the ground.

opportunity arose to travel to California I took advantage of it. The trip was made in September, 1938, and there I was in California without a job. While there I obtained several temporary jobs and finally, in April, 1939, I was employed by Consolidated Aircraft Corp., San Diego, as a draftsman working in the wing group of the experimental engineering department.

Finally, one year after my physical exam in Dayton, I received my appointment to the Army Air Corps but my orders did not, as I had originally planned, send me to Randolph Field. The now-famous Munich incident took place in the interval and Uncle Sam had wisely decided to expand his Air Corps. Consequently, under the Army expansion program I was sent for primary flight instruction not the 1,400 miles to Randolph Field, but about two blocks to the new training detachment there in San Diego. This meant staying right at Lindbergh Field for training under instructors of the Ryan School of Aeronautics, one of the nine commercial schools selected by the Air Corps for the primary training of flying cadets.

When asked what has impressed me most during my flight training, I am forced to mention two flights and true to expectations both included "soloing". On the 13th day of flight training my instructor, Rosmond Blauvelt, and I landed at Rosedale, one of the auxiliary fields used by Ryan, and we taxied back for a take-off. He climbed and said "you can take 'er around alone". I must have missed the confidence that his words were supposed to convey, for I felt anything but sure of what the result of this experiment would be. "Was I ready to solo?" I kept asking myself.

True, the plane was in perfect condition and my instructor said I'd been doing okay, but who wants to walk up to a lion and stroke its mane when its trainer takes a day off? Well, "Here goes," I said as I gathered my nerves together and pushed the throttle open.

We bounced down the field, as was my habit and, before I knew it, we—that is, the plane and I—were in the air. What a thrill it was. The absence of my instructor made the plane lighter and this lightness seemed to be transferred to me. I had little time for thoughts other than how to keep the plane up in the air. Was I climbing too steep? Were my turns a true 90°? Was my pattern a rectangle? Watch that air speed! Watch that altimeter! All these thoughts and many more flashed through my mind and before long I was gliding in for my first solo landing. But this time there was no reassuring hand on the dual set of controls. I sometimes wonder just how Blauvelt felt as he watched me with his fingers crossed. After landing I taxied back and received his congratulations. What a day! I had stroked the lion's mane and gotten away with it!

About a week after my solo, four cadets were chosen to be trained in a new Ryan YPT-16. This ship is a low wing monoplane of the basic S-T design and something new in Army training planes. Being the smallest cadet, I was among the four and our duty was to report on its adaptability for Air Corps training. Captain John C. Horton, our commanding officer, asked us to fly on Saturday and Sunday, our usual off days. You can imagine how mad that made me! Wednesday of that week the four of us soloed the new trainer. This solo flight, like my first, stands out in my memory.

It was on June 28 that I became a cog in the new Air Corps training program by enlisting at Ft. MacArthur, San Pedro, California. Before the enlistment was accomplished, I had taken two more physical exams within a period of 27 hours. Here my Army life began, for I stayed overnight and the following day reported to the Ryan School of Aeronautics where Captain Horton and Lieut. Lloyd P. Hopwood took the cadets in hand. All cadets were temporarily quartered at the barracks of a local military academy where all recreation facilities were at our disposal. After a six weeks stay there we moved into our fine new barracks built by the Ryan school for the flying cadets. To top it off we now have memberships in the San Diego Club, located about 10 minutes from the barracks, where there are swimming and gymnasium facilities, a ball room, lounges and reading rooms.

According to traditions of Randolph Field, every new cadet is called a

Flying Cadet William E. Zins

Newest Army trainer in use is the Ryan YPT-16 described in the accompanying article. Squadron below is author's. It's on same field as Ryan and Consolidated factories.

Technical ground school training is held for four hours per day. The author (right) is shown with an instructor.

"dodo" and as such is subjected to many rules. A "dodo" always wears his flying goggles around his neck until he can proudly shout "I have soloed". We've found the goggles mighty handy for eating grapefruit, but how those goggles do increase in weight with each pair removed by a brother dodo. Among the rules adhered to was that of remaining on the post for the first four weeks.

On July 5, our real Army Air Corps life began. Life here is not a dull one by any means. Up at 6:00 a. m. we jump into trousers and assemble, still rubbing the sleep from our eyes, for a 10-minute period of calisthenics. Twice within one week we had to rise at 5:30.

Brig.-General Barton K. Yount, Assistant Chief of the Air Corps, in charge of training, wanted to inspect the progress and facilities of the Army detachments at the commercial training schools. The Assistant Secretary of War, Louis Johnson, the very next morning caused our second rude awakening. But why am I kicking? We got out of the usual calisthenics.

Breakfast is at 7 a. m. after giving our rooms sufficient cleaning to pass the rigid inspections made. Off we go to the thing we live for from day to day—flying. We have been flying Stearman training ships, known in the Army as PT-13s, while the lower class is using the new Ryan PT-16s.

Most cadets are well pleased as they read the daily schedule of flights and flight instructors. Others, more concerned, are scheduled for "check flights" with Captain Horton or Lieutenant Hopwood, our commanding officers. These flights are jokingly said to be given in the "washing machine," a term of long standing in the training of Army cadets, for such a flight can carry the possibility of being "washed out" if the cadet's flying progress is not up to the high Air Corps standard. A mental hazard these check flights certainly are. How can a green dodo fly a plane right with that fear in his mind? Nevertheless, fly we must and, much to our surprise, generally become masters of the "washing machine."

All cadets must improve their flying to stay in the Air Corps for it is the most important phase of our course here. We even dream of flying. The first 10 hours of flying are dual hours during which the cadet learns how to take-off, land and perfect the coordination of controls so necessary to make the plane behave. After three supervised solo flights we are permitted to take the PT-13s up and practice what our instructors have deemed wise to teach us. Each cadet is constantly checked by his instructor and is taught new maneuvers as he progresses as a pilot. All cadets were checked during the seventh and eighth week of our 12-week primary period here to determine whether it was safe to teach us "aerobatics". We all passed. The flight schedule for our group lasts for four hours and then comes an hour of relaxation, better known as "mess".

Technical ground school training is likewise held for four hours per day. This is to quite an extent a repetition of what I learned at the University of Cincinnati (although other cadets unfortunately have not had similar technical training) but with more emphasis on the practical side. Two hundred and twenty-five hours of study will be spent on engines, carburetors, map reading, aerodynamics, navigation, parachutes, etc., before our training period of 12 weeks ends.

In the Air Corps, all cadets start on an equal basis regardless of education or flying ability. After three months primary training under Air Corps supervision here at the Ryan school, those of us who qualify will be sent to Randolph Field. Our number has diminished from 34 to 25 cadets to date. At Randolph a three-months' basic training course is given and from there cadets go to Kelly Field for a final three months of advanced work.

During 11 weeks of training here, I am proud to mention that I have nearly 60 logged hours, 23 of which are supervised dual training. In these hours Mr. Blauvelt has taught me spot landings, spins, chandelles, lazy eights, eights on pylons, precision flying and aerobatics. The aerobatics were taught during the ninth week and included loops, snap rolls, slow rolls, vertical reverses, Immelman turns and the like. Now to come to real flying time—solo. I have 35 solo hours to my credit and during these hours I have really been "on top of the world." There remains only a week to complete 65 hours of flight training and 225 hours of technical ground schooling.

On August 14 a new bunch of dodos arrived and it was up to we "upper classmen" to make them "feel at home". We carried out the time-honored tradition of Randolph Field and gently but firmly "indoctrinated" the dodos with the elements of military discipline and flying cadet customs. The dodos are one up on us at present for they began their training in the new Ryan trainers recently purchased by the Army Air Corps. Each and every one of the upper classmen have their hearts set on flying the new trainer but I hardly think we would trade places with a dodo just to fly the plane.

This is the work a cadet has to do while in the primary phase of the Air Corps Training and while doing so receves $75 a month plus room and board. After nine months of training, those of us lucky enough to weather the hardships will receive commissions as second lieutenants in the Army Air Corps Reserve and have the chance to enter into active duty for a period of three years.

END

Pilots' Handbook

A FIFTY-PAGE handbook for the use of private pilots and students qualifying for solo and private certificates under the Civil Aeronautics Authority's vocational flight training program has been published by the Authority. It constitutes a digest of information with which a student pilot must be thoroughly familiar in order to pass the tests for solo and private flying certificates.

In a form long sought by private pilots, it contains the Air Traffic Rules; sections of the Civil Aeronautics Act pertaining to the regulation of aircraft and airmen; information on meteorology and navigation; wind velocity scales and explanation of weather report symbols; certification and registration of aircraft, as all of these things affect the private pilot.

This is the first time that such pertinent material has been segregated from the mass of data contained in the complete Civil Air Regulations and is the initial step in the Authority's plan to present the Regulations in simplified form to the aviation fraternity. Heretofore it has been necessary for a student pilot to separate for himself those paragraphs applicable to private flyers.

These are a few of the 400 men who comprise the Civilian Air Reserve. Standard planes are used.

THE CIVILIAN AIR RESERVE

Special Order No. 6

General Headquarters
Civilian Air Reserve
Toledo, 26 July, 1939

1. All commissioned and enlisted personnel of Squadron 3 will report at Stickney Avenue Airport at 6 p. m., 26 July, for inspection, flight training and ground drill. The squadron will be inspected by the Chief of Staff immediately after roll call. Bombing and pursuit missions will be carried out in conformity with orders to be prepared by the Plans and Training Officer. The Communications Section will maintain two-way radio communications between these headquarters, the Stickney Avenue Airport and Municipal Airport during the hours of these maneuvers. The Photographic section, with field equipment, will be held available for such duties as may be prescribed by the Squadron Commander. Recall from drill will be sounded at 8 p. m.

By Order of the Group Commander
L. L. SMART,
Colonel, C. A. R.

Official:
C. A. Carson,
Captain, C. A. R.
Adjutant.

TOLEDO'S C. A. R.

by EARL C. GREBE

This is another typically American city whose air-minded banded together for their mutual benefit. The Civilian Air Reserve of Toledo sets an example well worth following.

MORE than 400 Toledo men receive such orders as these every week and are learning to carry them out with enthusiasm and skill in an effort to do their bit toward perfecting America's air defense.

The Civilian Air Reserve was hatched in the mind of Milton Knight, secretary of the Libbey-Owens-Ford Co., a sportsman pilot. Knight felt that private flyers would spend more time in the air and perfect their technique if they had something more interesting to do than just to hop around above the airport

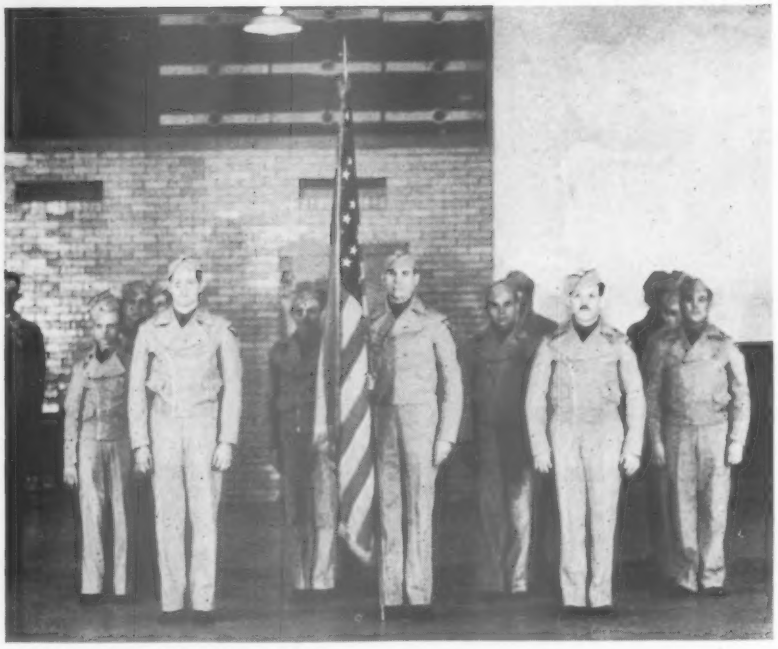
When submitted to a dozen or so persons interested in aviation, the idea found immediate favor. An Ohio charter as a non-profit corporation was obtained and the founders went to work to spread their idea. A public meeting was called and more than 500 attended. Most of these filled out membership applications before leaving the hall. There followed a mass of paper work for the adjutant's office. Applications for membership continued to swamp the place.

The founders, organizing themselves as a general staff, met almost nightly to sort out the prospective members according to their capabilities and to deal with the many questions naturally facing such a semi-military public organization. Finally every man was assigned to his place and training could start. Officers were commissioned to fill the line and staff positions in the three squadrons that were organized and a continuing service record built up for every man.

While the original idea was merely to further private flying and to make a few men better flyers, it quickly became apparent that the Army Air Corps expansion program had aroused so much public interest that hundreds of men wanted a place in the organization so that they might get some training against the day when the nation may call them. In view of this it was decided to model the organization as nearly as possible along the lines of the Army Air Corps.

Every plane owner and licensed pilot at the city's two airports applied for

C. A. R. officers and members follow Army methods closely, even to special uniforms.



For C. A. R. members whose duties do not require classroom work, drills are held in a National Guard armory. Many military practices are followed by Toledo group.

membership. In the organization of the three squadrons, three of the best men were commissioned captains and assigned to duty as squadron commanders. All other flyers holding civil or military licenses were commissioned first lieutenants and assigned as flight officers. Three flights, each consisting of three planes, comprise a squadron.

Students who have not yet obtained their private licenses are commissioned second lieutenants and assigned as observers. Each squadron has a maintenance section, commanded by a sergeant, with a corporal and five privates assigned to each ship as a ground crew. Most of the enlisted men are students from aeronautics classes in the technical high schools. Others are mechanical experts from the city's automotive industries, while not a few are just average young Americans, proud to wheel the ships in and out of the hangars, wipe off the cowling or police the grounds in exchange for classroom lessons.

The work goes on in winter as well as in summer. When the weather is unfit for flying weekly classes are held in the lecture rooms and laboratories of the city's Vocational High School. Theory of flight, aerodynamics, navigation, meteorology all are taught by experts in those lines. Public cooperation with these classes has been generous. The head of the local weather bureau teaches the class in meteorology. Several high school teachers and one or two from the University of Toledo give their time regularly and without charge to this work.

Members of the Officers Reserve Corps lecture on military topics, including the employment of aviation in connection with operations of the other arms of the service. Major General H. H. Arnold, commanding general of the Army Air Corps, expressed his full approbation of the program of the Civilian Air Reserve, with the suggestion that request be made of the Commanding General, Fifth Corps Area, that regular officers of the Air Corps be sent from time to time if possible to lecture.

For those whose duties do not require classroom work, drills are held in a National Guard armory. West Point style and snap are not expected, but the membership has been taught to stand and march in a soldierly manner so that a good appearance may be made when the corps is turned out in uniform for participation in civic ceremonies.

On one occasion the C. A. R. stole the show in a parade by having three flights of planes flying over the line of march, maintaining two-way radio communication with a truck operated by the communications section in the parade. Messages from the truck and the planes were sent out over a public address system.

Flyers and aviation enthusiasts in other cities who may want to organize Civilian Air Reserve units in their communities can communicate with Frank Hoffman, chief of staff; or Clarence A. Carson, adjutant; both of Toledo. These officers have been through the mill of organization days and can give many tips on problems that are sure to crop up. It has been found in Toledo that the whole setup must be kept on a basis of no dues and no assessments. Two or three public-spirited citizens may be found in any community to contribute the few dollars needed for office supplies and city and state governments will be glad to make school and armory quarters available for classes and drills.

END

Hero

JACK DAUGHERTY, Braniff Airways district manager at Brownsville, Texas, is the proud possessor of President T. E. Braniff's first letter-of-the-month which hereafter will go regularly to the employee performing the most humane act.

Daugherty was credited with saving the life of a 19-year-old girl in getting her to San Antonio and a specialist's care. The girl is Miss Ruth Townsend of Harlingen, Texas, a student at Baylor University. On June 19 a chicken bone lodged in her thoat which almost entirely shut off her breathing. A Harlingen doctor advised Mrs. J. D. Townsend, the girl's mother, that a special instrument was necessary to save the girl's life, the closest being in San Antonio. She hastily phoned Daugherty at Brownsville, 40 miles away, asking him to get the girl to San Antonio by plane immediately. Daugherty, then in the process of dispatching Braniff's 12:30 p. m. ship for San Antonio, held the plane while an ambulance rushed the girl to Brownsville. He and the ship's crew prepared a special compartment for Miss Townsend and instructed his San Antonio office to greet the delayed flight with an ambulance and a doctor. Delayed 59 minutes, the plane took off for San Antonio, reaching there in time for a specialist—with the special instrument—to save the girl's life.

Pacific Line

PAN American Airways soon will start a regular scheduled air transport service—for passengers, mail and express—over an 8,000 mile route across the south Pacific to link America and Australasia on four day schedules which will clip 11 days from the fastest existing transport time between this country and its fourth largest world market area. The route outlined by Pan American extends from San Francisco, the present base of the transpacific service to China and the Far East, 365 miles to Los Angeles, thence 2,561 miles to Honolulu. From Hawaii the new Pacific route would turn south and west 1,913 miles to Canton Island, lying just across the equator; thence 1,989 miles over the Fiji Islands to Noumea, New Caledonia, with the final 1,124 mile leg from Noumea to Auckland, completing the 8,000 mile route to the Antipodes (actual mileage 7,952).

New Airliners

FOUR new Douglas DC-3 airliners will be added to the Braniff Airways fleet on or about November 15. The giant ships, with luxurious facilities for 21 passengers and a crew of three, together with extra engines, radio and other equipment, represent an investment in excess of $500,000.

Two-Fisted Business Man

by

EDWARD CHURCHILL

Alvin Adams, in five short years, turned Western Air Express into a going concern.

He made a full-fledged airline out of a mere shuttle service. He is an ex-champion in collegiate boxing. In short, he is Alvin P. Adams.

THIS is the saga of a determined fighter. When and if United Air Lines absorbs Western Air Express, operating from San Diego, California, to Great Falls, Montana, it will get a model airline. The line was far from model five years ago, as you will see.

The man who has literally been father and mother to it, who in five years has turned a neglected, poorly-equipped, inadequately staffed and generally forlorn airline into one of the most efficiently operated organizations in the country, is a blond, streamlined, square-chinned young fighter of 33 years named Alvin P. Adams.

Right now Adams is fighting to save the entity of his company. He and the minority stockholders see great things for it in the future and want to hang onto it. Majority stockholders want to sell to United Air Lines, cashing in on the advances young Adams has made.

Adams, an ex-amateur fighting champion has proved at least two things in the past five years. The first is that there is still romance and color in American industry—particularly this young and thriving infant, aviation. The second is that there is always room at the top for a young man with ideas.

He has always been fighting, one way or another. While attending Yale, from which he was graduated in 1927, he was for four years eastern collegiate boxing champion in the weight classes in which he fought. This apparently has much to do with his current career.

Now he's playing David in a David and Goliath act. United Air Lines wants Western Air Express for several reasons. One is that Alvin Adams has built it in five years to a point where each time one of its ships flies a measured mile it costs the company 53 cents whereas United, traveling the same distance, reaches into the cash register for 70 cents. Another is that Adams has husbanded a virtually bankrupt concern until today the assets, amounting to $457,000, are five times greater than liabilities of $90,000.

It looks as if the company, which extends from the Mexican border at San Diego to Great Falls, Montana, not so far from the Canadian border, will continue expanding to Lethbridge, Calgary, and Edmonton, and may be the logical American origination of a line to Alaska. The Civil Aeronautics Authority already has been working with Canadian authorities on the proposed run. And United would like to have the company because it would be more convenient for passengers to fly right through Salt Lake City on the same plane than to change at Salt Lake City as they do now, if they have started from Los Angeles, San Diego, or any intermediate point on WAE. Adams has this last point licked. For months he's been fighting for permission from CAA to authorize an interchange of equipment. As this was written the examiner approved the plan and a decision was to be handed down by the CAA within the following 30 or 60 days.

"Small lines," says Adams, "can operate much less expensively than big lines. When companies expand too much, costs per mile advance at the same time. America wants economical air transportation and consolidation is not the way to get it."

It looks very much as if the Adams way, in contrast, will bring us economy. For Adams, ex-fighter, not only refuses to pull his punches but believes in head work. There's romance, there's color in the head work which he's done. He's the typical dynamic hero of the current business fiction story. The only thing missing is the beautiful young secretary. Adams is married, has two children—and the outer office is presided over by a very efficient young gentleman named Brown.

The average passenger misses the romance. He buys a ticket, climbs into the appointed ship at the appointed time and alights at his destination a few hours later, quite unmindful of how the airplane happened to be on the line in the first place.

Here's the story, as far as WAE is concerned.

When Alvin P. Adams took over the presidency on December 29, 1934—his 29th birthday—the line was in sad condition. He had been a director in the company for several years, had figured its potentialities for some time and had tried to get National Aviation to buy in. When this failed he persuaded W. A. Coulter of Philadelphia; Earl Smith, broker; Floyd Odlum, president of Atlas; W. R. K. Taylor, New York financier, and others to acquire the 65 per cent holdings of North American Aviation and General Motors in Western Air.

"I found," says Adams, "four Boeings, no stewardesses, one scheduled daily flight from San Diego to Salt Lake City, the dispatching handled by Jimmy James, vice-president in charge of operations, inadequate radio facilities handled by TWA, the traffic office in Los Angeles on Ninth street outside of the general business district, no provisions for advertising and publicity, no teletype system, weather reporting hit and miss, pilots without uniform coats and radio

stations located only at Salt Lake City, Milford, Utah, Daggett, Van Nuys and San Diego."

That was the score when Adams rolled up his sleeves and went to work. Things started to happen with amazing rapidity.

In no time, the traffic office moved into the line of fire at Sixth and Olive—with United Air Lines. A modest advertising campaign was started. Traffic offices were opened at Los Angeles and San Diego. Attractive stewardesses were employed to make the passengers comfortable. Airway maps were prepared to give said passengers more interest in their flights. Meal service was inaugurated. A Link trainer was installed so that pilots could receive blind flight instruction. The pilots got uniform coats and the ground crews were put in uniforms. Adams arranged for the line to have its own communications system, divorcing it from TWA.

And, in addition to all this work, Adams was busy with the Government. He convinced the Post Office Department that there was need of a second round trip between Los Angeles and Salt Lake City. The Government said yes, that was right, and authorized the flight, except Sundays and holidays. Adams proved he was no piker.

"Thanks," he replied, "and just to show you how much I appreciate this, I'll fly the round trip Sundays and holidays, too, hauling your mail without charge to give you better postal service."

Then he started a drive for airway facilities. To get up to the minute on what he's done in connection with this we have to jump to August 1, 1937, when Western Air Express did a little absorbing of its own. Adams went out and collected unto himself National Parks Airways.

"We put the new branch on an efficient basis, first of all," he says. "Among other things, we reduced rates. We went into cities on the line with Boeings and Douglases. The natives looked up with considerable enjoyable surprise to the DC-3's, and DST's. They'd never seen them before. We offered excursion rates as well as reductions. Round trips for the price of one way. We changed uniforms, opened traffic offices."

The rush was on. In the first six months of this year, the Adams technique had doubled the business for the first six months of 1937. But, to get back to communications. Adams says:

"We succeeded in getting lights from Helena to Great Falls. There were radio stations only at Helena, Butte and Idaho Falls. Our entire route now is covered with Government stations at Great Falls, Helena, Butte, Dillon, Dubois, Idaho Falls, Pocatello, Plymouth and Salt Lake City on the new division and at Tintic, Delta, Milford, Enterprise, Mormon Mesa, Las Vegas, Silver Lake, Daggett, Palmdale, Newhall, Burbank, Long Beach, Oceanside and San Diego."

That is progress. And that, too, is a model airline. It's all hitched up with teletype. So efficient have the weather reports become, with balloon runs, that the company has speeded up flight time eight miles per hour. In other words the pilots, given advance information that is correct, are able to fly, let us say, at 10,000, where there is a ten-mile tail wind, rather than at 4,000, and buck a ten-mile head wind.

"Close study, careful cooperation and the use of all facilities have made this possible—the integration which is possible only in a reasonably small unit," Adams says. Just to be sure he was on the right track, Adams dragged in the California Institute of Technology on these flight problems.

How can a small line save money?

"You won't have to turn on the floodlights for this one, Fotheringill. . . ."

Well, Adam's gasoline gag is one for any book. There's a heavy gasoline tax in Utah. When a ship leaves Los Angeles it is gassed to reach Las Vegas, Nevada. At Las Vegas it is gassed again—so thoroughly that it is able to go to Salt Lake City, load without gassing and return to Las Vegas for a tankful, thus saving the company—believe it or not—about $500 per month. Adams thought that one up.

How else is money saved? Pacific Aeromotive Corporation, located at Union Air Terminal, about a half mile from the WAE offices, does all motor overhauling. Labor is paid for at so much per hour and the factory discount, less handling is allowed on parts. Result? A saving in capital investment, inventories and obsolete parts. No great sum tied up in tools, no money paid to mechanics for leaning against hangar doors between services.

WAE operates seven planes. There are three Douglases and four Boeings. With these seven ships Adams has figured out operations which seem fabulous without the use of mirrors. There are three round trips a day, Los Angeles and Salt Lake City, with the Douglases. A single Boeing makes two round trips a day, Los Angeles and San Diego. The three other Boeings shuttle back and forth on two round trips a day between Salt Lake City and Great Falls, one Boeing being held in reserve for emergencies.

"A small line," says Adams, "can operate on such margins. Time in the air is a big factor when you are figuring depreciation. There are no ships having obsolescence charges put against them while they gather dust in hangars. Insurance charges are also lowered."

And a lot of others. The two Douglas sleepers were purchased two years ago. As of June 30, one had logged 4,706 hours and the other just a hundred more hours—an average of 2,400 hours a year. One hundred solid days in flight out of 365, or about seven hours of flying a day! The third Douglas was bought second-hand in May, 1938, and has logged 3,000 hours since that time.

Adams has figured savings even in food—without hurting quality. He is now operating his own commissary in Salt Lake City with an estimated return to the treasurer of about $200 a month, which is quite an item.

Another system developed by Adams is that of using joint facilities. It's cheaper for two companies to share an office than one, and both get just as much work done. So Adams has worked out a share-the-bills system for traffic offices at San Diego, Los Angeles, Salt Lake City, Butte and Great Falls. The company pays United Air Lines handling charges on both ships and passengers. And Adams has also discovered a way to collect. When TWA crosses WAE at Las Vegas, Adams collects for handling TWA's radio and refueling. At Helena, Northwest Airlines handles WAE servicing and at Butte WAE does some of Northwest's servicing. "This," says Adams, "makes for economies."

And it also makes for general good-fellowship, understanding of the other fellow's problems and the sharing of mutual ideas for improvement of service.

What of the financial record? In 1934, before the ex-fighter took over, the loss was $153,000 and total passenger revenue amounted to only $182,000. In 1935, under Adams' management, the loss was cut to $8,000 and passenger revenue jumped to $269,368. It was dur-

(*Continued on page* 86)

SHE MAKES FLYING PAY

By KURT RAND

Rosa Stafford has been an air service operator for six years and still is going strong.

Rosa Stafford got into the aviation business when she sought a place to store her private airplane. She has ten today.

Ted Morton taught Miss Stafford to fly, later joined her at her request as co-operator of their present air service.

"HEY, Rosa—think I can make Metropolitan airport today?" "Not in our airplanes. There's too much of an overcast wrapping those Hollywood Hills."

Question by a fledgling pilot. Answer by titian-haired Rosa Stafford, co-proprietor of one of the largest flying services in southern California. Rosa sits competently in the inside office of her flight building checking time on one of the ten sleek ships of the Morton Air Service. At the same time she is figuring the costs on a charter flight to Yuma, Arizona, in one of the company's Fairchilds.

For six years fledgling pilots have been confidently firing questions at Rosa Stafford seven days a week—and for six years she has known and has given the answers. The oracle of Los Angeles Municipal Airport, a mile-square slab of land southwest of Inglewood, California, is making flying pay. She has made it pay ever since she came to California in 1931 with a lot of pleasurable flying hours behind her, knowing that the fun was over and that work—a new career—had to begin.

In 1931, when Missouri-born Rosa looked at the flat plain which extended around the huge airport, she got an idea. The idea was that this was a good, safe place to learn to fly and that there were more than a million potential customers in Los Angeles and the country surrounding it.

She was confident that this particular slice of land could be made to pay off, and that a flying organization which would give real service—aviation in all its branches—would click. Her confidence grew when she visited two hangars to find out about storing her Cessna—and found two hangars practically deserted. She had trouble finding someone to wait on her.

Back in Tulsa was a young man who had taught her to fly, and in whom she had a great deal of confidence. His name was Ted Morton. He had trained hundreds of students in Kansas City and later in Tulsa, without scratching them or an airplane. He had been one of the flyers who had pioneered old Richards Field there, who had helped discover and develop New Richards, and had helped steam the community into going for a bond issue which had made the Kansas City Municipal Airport a reality. Later he had come to Tulsa and there, before the depression, on the Old McIntyre Field, he had taught her to fly a Stinson at $25 an hour—10 good, honest, hard hours at the stick.

Rosa Stafford had learned to fly for the fun of it. She recalls today, many years later, when the desire was planted.

"When I was 12 years old a barnstormer in a pusher biplane appeared at a fair at Bolivar, Missouri, not far from Buffalo, the town where I was born," she related. "The pilot was a merry wag, and promptly told me he'd let me sit on the wing and go for a ride—if I'd get my parents' permission.

"My mother and father issued a horrified negative.

"That made them the villains, in my mind, and the pilot the hero. Later I realized that he probably wouldn't have flown me anyway. But I resolved, then and there, that some day I'd fly."

Much later, in 1928, when the first airlines threaded the country with their feeble net, Rosa Stafford flew many thousands of miles in the first tri-motors or anything else that happened to be in service.

"This time there weren't any parents to say no, so I flew—and fell in love with the game," she declared.

She wanted to learn to pilot. Soon Morton was showing her the way of the controls in a Stinson, one of the first cabin jobs in the middle west, and open ships. She particularly liked night flying. She logged about eight hours of after-dark flying in no time at all. She was, Eddie Stinson told her, the first woman to solo a closed job. Later, he went to sell her a ship, a Stinson. He did. She logged plenty of hours on it, then invested in a Cessna. She came to the Pacific Coast, looking for a place to store it.

And that's what started her as one of the few women who make flying a business. Morton joined her at her request. Service and safety were the slogans of the company, which at first boasted of only the Cessna. Bill Piper, Jr., came to the coast and Rosa and Ted promptly saw the value of a light training ship in cutting cost of instruction for the customers. So Morton Air Service

This is the hangar operated by Morton Air Service on Los Angeles municipal airport. The company charters its ten airplanes, teaches flying or rents hangar storage space.

soon blossomed forth with a *Cub*—said to have been the first in service on the Pacific Coast.

When Rosa Stafford came to municipal airport to store her Cessna there were only a few ships on the line. Today you can see more than 40 in good weather, many more stored in the big hangars. Ten are operated by the Morton Air Service. For training there are a Ryan, an Emsco, two Waco "F" biplanes, a de luxe Luscombe, a couple of *Cubs,* a Taylorcraft and two Fairchild cabin jobs. For those who want to go places in a hurry on charter, the four-place, sound-proofed and radio-equipped Fairchilds are ready at all times. And, in addition to training, rental and charter work, Rosa and Ted will furnish information, technical advice and rent ships to motion pictures. Morton ships have flown in several productions. Morton not only has handled the controls but has been technical advisor on two recent films.

Rosa also has built up a reputation for sales—she is considered one of the shrewdest traders in the west—and service. Everything from an overhaul to two gallons of gasoline for a *Cub.* And storage. On motion pictures she has seen that the ships were serviced properly, that they were on the jobs on time, and has helped with research.

"You can make money in operations if you're careful," Rosa says. "The main thing is to keep up equipment. We have several mechanics working on the planes at all times. We never send one out unless we know that it is absolutely all right.

"We have only one inviolable rule. We don't care how many thousands of hours a pilot claims to have had—he goes for a check flight before he solos our planes.

"We've lost a little business that way. Some pilots are a little heavy on the ego, and don't like to have their ability questioned."

But, on a couple of occasions, the firm has sidestepped trouble.

The partners are extremely modest. Rosa tells the story of the time she went to another airport to buy some parts, landed her ship, taxied to the line and got out. She doesn't dress, talk or look like a flyer. As she walked up the line, a salesman of sightseeing rides picked her as a customer. He spent several minutes trying to sell her a ride. Just for the fun of it she listened for some time, and finally told him:

"You couldn't get me into one of those things."

She enjoyed the joke and rather imagines to this day the fellow figures himself a poor salesman.

Morton is just as shy. With around 5,000 hours to his credit, he looks like a business man who has just stepped out of an office.

"Flying *is* a business," he insists.

Rosa takes a back seat when it comes to instruction. In addition to Morton there are five pilots actually engaged in charter and instruction work. They include Paul Gustine, former airlines first pilot; Eddie Angel, motion picture stunt veteran; Charles Botsch, Everett Gardner and Paul Hill. They all call Rosa the boss.

Rosa uses any excuse she can to get into a plane. She loves to run errands. Out comes a ship and she's off to Grand Central Air Terminal to buy parts; to San Diego to inspect a plane which she is considering buying; to San Francisco to interest a customer in a ship she has for sale. A shrewd "horse trader," she buys practically all of the Morton equipment. On two occasions she has bought ships sight unseen. She had found out all there was to know about them from listening to pilots who knew their histories. She is an excellent listener.

Rosa dislikes publicity. She won't talk about it, but in the days when she had just soloed and was flying for the fun of it and love of the game, Eddie Stinson wanted her to make a transcontinental flight to attract interest to his ships. He'd furnish plane, gas and everything.

"But I don't want publicity!" she protested.

Nor does she talk of the Oklahoma days, when she was in and out of practically every field in the middle west. These are past performances, and she has today and tomorrow to think about.

Her ambition is to be the oldest living woman pilot.

"I guess," she says, "that's why I can't tell you I have had a lot of close calls and narrow escapes and thrills. I don't fly that way. The boys call me a gambler. They say I'll take a chance on just about anything from a horse race to a raffle. Maybe that's true, and maybe it isn't. But my chance-taking ends on the ground. That goes for both myself and my equipment."

In hundreds of hours of day and night flying she never has had so much as a forced landing. She has only one regret—that more women don't fly.

The boys at Municipal, who usually frown on the jodhpurred blondes who boast about their 15½ hours, love Rosa. They think she's a great flyer and a grand gal. A lot say they'd rather fly with her than with a man. Rosa makes no comment on this—but the record shows she carries a lot of friends.

Rosa, in a way, walks by herself. She's on the ground, commanding, ordering, keeping books, checking time, planning equipment purchases, getting ships on the line, ordering inspections and repairs, interviewing prospective students and plane buyers and handling a thousand and one other details from nine in the morning until the ships are pulled off the line.

But early in the morning, or late at night, when the field is quiet and cares can be set aside for a while, Rosa forgets the business of making flying pay—and takes off to recapture the fun of the game.

END

Large Order

NUMERICALLY the largest order placed by the Air Ministry for one type of flying boat has been awarded the Saunders-Roe company for *Lerwick* high-wing monoplanes which will re-equip certain Royal Air Force general reconnaissance squadrons. Range and speed of the *Lerwick* still are official secrets but they are known to be greatly in excess of the performances achieved by their predecessors in service. Britain's newest military seaplane is designed to carry a crew of seven, who will fulfill the multifarious duties of open sea and coastal reconnaissance. Three power-operated gun-turrets provide the means of formidable self-defense against attacking aircraft. Powerplant consists in two moderately supercharged Bristol *Hercules* 14-cylinder sleeve-valve engines housed in the leading edge of the wings.

Anti-Hail

IN an Italian flying school a special group known as the anti-hail section has been instituted, with the object of investigating the meteorological phenomena of hail formation. Special machines have been built which are capable of carrying out flights under all weather conditions in the storm zones in order to measure the temperature, the humidity and electric potential. Attempts are also to be made to prevent hail formation in a hail zone or in fog by exploding special bombs inside the cloud or fog. The final objective is to be able some day to use aircraft to prevent the occurrence of damage as a result of severe hail storms.

I Learned About FLYING From That!

— No. 8

by DICK GRACE

The most famous of daredevil pilots adds his story to our collection. The man who specialized in plane crashes came close to having one he hadn't planned.

Dick Grace

I WAS pouring it on between Los Angeles and San Francisco, nosing up for the coast range back of Piru, when two cylinders exploded. First they were there, then they weren't. With them went the prop. I was afraid of fire and I knocked the throttle back. I didn't need to do that. The motor was through. Later, I found out the crankcase was broken. Then, I wasn't worrying anything about engines. I was trying to figure the way down.

The weather wasn't so hot. I'd been ducking clouds—scattered babies that I'd been whipping into more and more frequently—almost since leaving the old Venice flying field. The job I was flying was one that I had intended to buy. It had a lot of hours on it and it was supposed to be in good shape. It was a Ryan M-1, a high-wing monoplane, three-place and open, with a nine-cylinder J-4B Wright giving me 200 h.p. up until now. It was the year 1927.

Right away, I saw that I had my hands full. I had about 1,500 feet vertically above terrain but the mountains lifted ahead of me and the ridge they made was over my head. So what lay ahead was out. As a stone drops, there were jagged foothills. Behind me were more craggy ridges jutting up at me. Luckily I knew my wind. I got wise to wind when I started learning to fly in Minneapolis in 1914 in a Wright. It always stayed with me, that business of knowing how I was drifting. The last check I'd made was on a brush fire near a house a couple of minutes before. I lost 500 feet looking for a postage stamp, and I found it. It was oblong and rolling. It was dotted with trees. But it looked less perpendicular than anything around those parts.

I made a 360° turn around it and dropped 500 more. By this time I was in a pretty good spot—low enough to get the profile around the postage stamp and high enough so that I could make another 360° as soon as I figured my play. I soon found I had a choice between into-the-wind, which meant dropping into the field over an almost perpendicular rise and down-wind, which meant coming in fast, but at that end of the field the ground only sloped up, and let me get in closer.

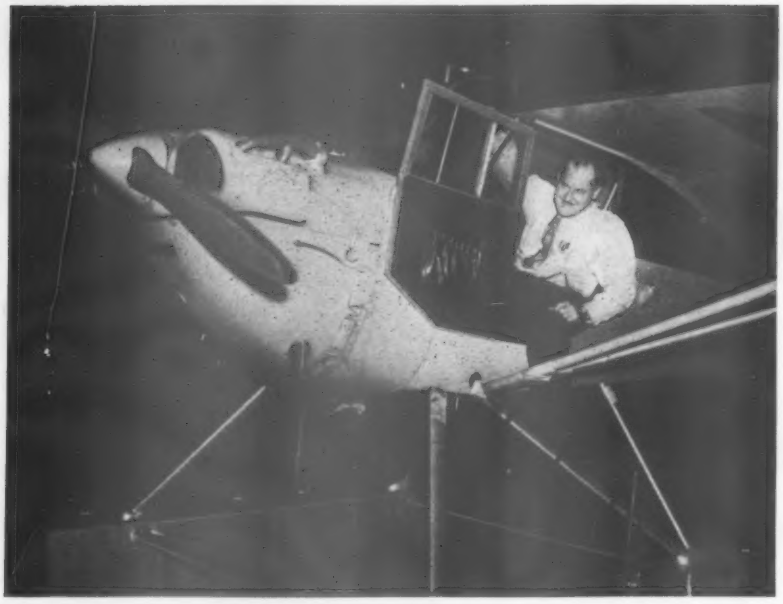
So I let her have it. I shot across the field down-wind, chandelled, reaching close to the stalling point nearly against the steep wall at that end of the field, caught the ship at the stalling point, finished up 90° into the wind and set her down. The ship bumped, rolled forward until the left wing hit a tree and ground looped. Anyway, I was in and alive, even if I did have a caved-in leading edge to show for it.

The field was really tough. I got a

(*Continued on page* 80)

Dick Grace, famous for realistic and often nearly-fatal crackups for motion pictures, has 11,000 hours of piloting to his credit. Born in Morris, Minnesota, in 1898, he moved to North Dakota with his father (who became chief justice of the state supreme court) when he was six years old. He learned to fly in 1914, attended the University of Minnesota, went into the Naval Air Service, instructed at Pensacola, and later flew with the Northern Bombing Group and in Italy. After commercial experience he began flying for motion pictures and his crack-ups for the camera in such pictures as "Wings" and "Lilac Time" made him famous. He survived a broken neck. While still flying, Grace has devoted recent years to writing and is credited with several original stories for the screen, including "The Lost Squadron," books on his flying experiences and novels. He says that he still feels he has a "couple of crackups left in his system".

This is an example of the sort of thing the author deliberately did for the movies.



The author (above) landed at New Orleans with 20 out of his total of 81 gallons of fuel still in the ship's tanks. Extra fuel was carried in the hollow metal pontoons.

SEAPLANE ODYSSEY

by

HENRY B. CHAPMAN

Another lightplane record falls. The author vividly describes his 1,120-mile non-stop flight from New York City to New Orleans in this exclusive article.

WHEN I took off from Floyd Bennett airport in New York on the morning of October 12, there was a non-stop record for light seaplanes waiting in New Orleans. The idea of the flight was to keep the appointment with the record but not, however, for its own sake. The record was going to prove the contention that the light seaplane holds a place beside landplanes in aviation.

It was 6:01 a. m. when I lifted from the seaplane base of the Coast Guard in Jamaica Bay. The conditions were uniformly favorable, with the possible exception of a smart breeze, but I'd spent a large part of the previous afternoon learning what to expect. I passed over one of the shoals and caught the tide rips. Then, after a slightly longer than normal run, the take-off proceeded easily and immediately afterward the motor was throttled to normal cruising r.p.m.'s and we continued to climb well.

Swinging back from northeast where I'd taken off, I circled the field and waved to my sendoff party. I'd begun the flight and set my course for Atlantic City. For a while everything went smoothly. There had been plenty of thought and preparation put into the flight. For years I had been flying heavier planes for both school and charter work and buying my first light airplane in 1934 took considerable will power. Not that I wasn't pretty well convinced that the lightplane was the thing to operate during the depression; I was just as sure that I wouldn't like to fly a lightplane. As a matter of fact, I bought my first Aeronca without having flown it, knowing that I was going to have to sell myself on actually flying it. I was sold in about six hours. After that I knew the light airplane could do anything the heavy airplane had done in my work.

To some extent, this flight that I now was making had grown out of the difficulties I'd run across in my work. Invariably during bad weather, there would be searching parties sent out over Lake Pontchartrain and the Louisiana marshes, hunting sportsmen who were missing. The main headache on all these flights was a limited cruising range which necessitated returning to the base for additional fuel and made it impossible to conclude a search in a single flight. Now I wanted to prove that it was entirely feasible to carry additional loads of fuel and oil. Both Carl Friedlander, president of my firm, and Carl Wootten, vice-president in charge of sales, had plenty of faith it could be done.

Trouble showed up over Atlantic City. The ceiling took a dive to 1,500 feet and the visibility began closing out just as the beginnings of a rain came down. Well, there I was staring another possible failure in the eye. I'd figured I had my share on my way north, when I'd abandoned a flight because of bad weather and unfamiliar terrain, and had had to lay over on a lake in the Virginia hills. This was my second shot at the record and the proof of an idea—and it had to come through.

I'd just about made up my mind that the flight had to be a success when the ceiling began forcing me down again. Ten miles southwest of Atlantic City there was a thick layer of soup 700 feet off the ground and the drizzle made up its mind and steadied into a needle shower. I hugged the smooth, unbroken coastline and dogged it for Cape May, at the mouth of Delaware Bay. By the time I hit it, the ceiling was nudging me somewhere near 200 feet and visibility was pretty much of a memory.

It didn't seem as if it could get much worse, but it did. At Cape Henlopen Lighthouse I beat it inland for Richmond and about 15 miles out of Richmond airport I hit the jackpot: zero-zero. Back I went to the Rappahannock river. Twenty miles northwest and then southwest again. Then halfway up the Parmunky river, zero-zero again. So around I went again for ten miles, picked up Beacon Tower 48-A pointing to Richmond, due south, and out of Richmond I determined to resume the course I had plotted.

Going southwest again, the ceiling and visibility stuck together to plague me. Remembering the flight, I can't understand really why I didn't do what I had considered sensible and prudent before; leaving the soup to seagulls and getting down out of it while there was a chance. The only thing I can say is I didn't. And minute after minute up there, I was feeling sorrier.

Maybe it was because I felt the flight

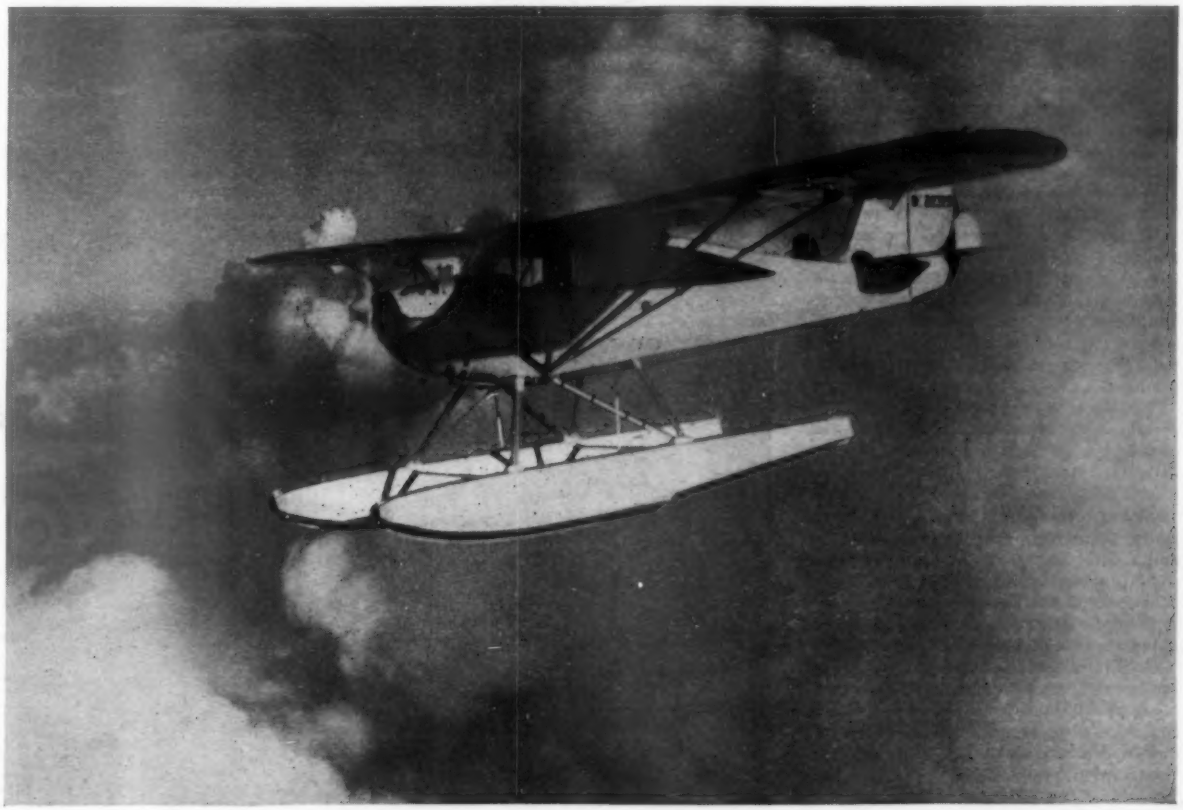
was more than I'd thought it was. For one, the plane I was using was a standard model in every respect. We hadn't found it necessary to make a single change in the basic structure of the ship; even the necessary extra fuel was carried in the pontoons, 38 gallons in each. Aeronca's chief engineer, J. A. Weagle furnished schematic drawings for the fuel-line installation, from which we installed gas lines and fittings and, as a precautionary measure, gascolators in the line from the pontoons to the main gas tank. Altogether there were 81 gallons of gas and two gallons of oil; the oil capacity of the engine had been jumped from one gallon. The normal seaplane has a cruising range of 250 to 350 miles. The pontoons serving as gas tanks extended the cruising range of my standard Aeronca to approximately 1,500 miles. The gross weight of the plane at the time of the take-off was 1,593. Of this, 340 was equipment and fuel. My plane itself weighed 1,253 pounds.

I was carrying nothing more than a Lear portable radio receiver, the official barograph and the usual maps, ropes, flashlights, sandwiches (mainly ham and cheese) and coffee. The other preparations had consisted of a couple of test runs to see how long a run the loaded plane would need, the customary 20-hour engine checks, and getting the flight recognized by the National Aeronautics Association's representative in New York, Wm. C. Zint. Harry Howze of Standard Oil supervised

(*Continued on page* 87)

This picture was made as the author circled over Lake Pontchartrain at the end of his 13½-hour flight. The flight originally was to have been from Louisiana to New York.

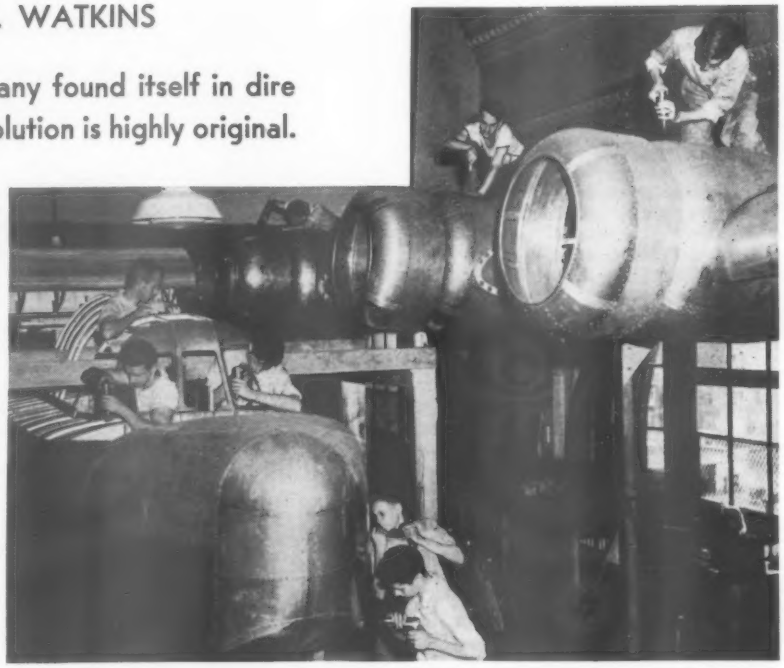
The record-breaking ship was a standard Aeronca. Fully loaded for the flight it weighed 1,593 lbs.



★ MANUFACTURED AIRCRAFT WORKERS ★

by JOHN C. A. WATKINS

The Glenn L. Martin Company found itself in dire need of skilled workers. Its solution is highly original.



These young men attended the Baltimore vocational school for one month, then were sent to the Martin plant for actual working experience. They have proved capable.

PROBABLY the most exasperating single problem the Government has had to face in its really herculean task of doubling the size of the Army Air Corps in two short years is that of providing trained personnel to operate and maintain the new aircraft.

Inasmuch as those responsible for the success of this phase of the enlargement program are dealing with human beings, rather than inert metal and fabric, their task is more difficult in many ways than what is admittedly the hard job of getting the aircraft on time. Moulding a lump of dural into a fitting is, of course, very different and much more certain of success than moulding a boy into a pilot or mechanic.

Of course, everyone knows by now how the Air Corps is going about the task. How, for instance, civilian flying schools have been pressed into service to give primary flight training to flying cadets and student officers. How, to get the mechanics who are as necessary as the pilots, other commercial schools have been drafted and the existing service technical schools, at Chanute Field, Ill., and Lowry Field, Colorado, are being enlarged.

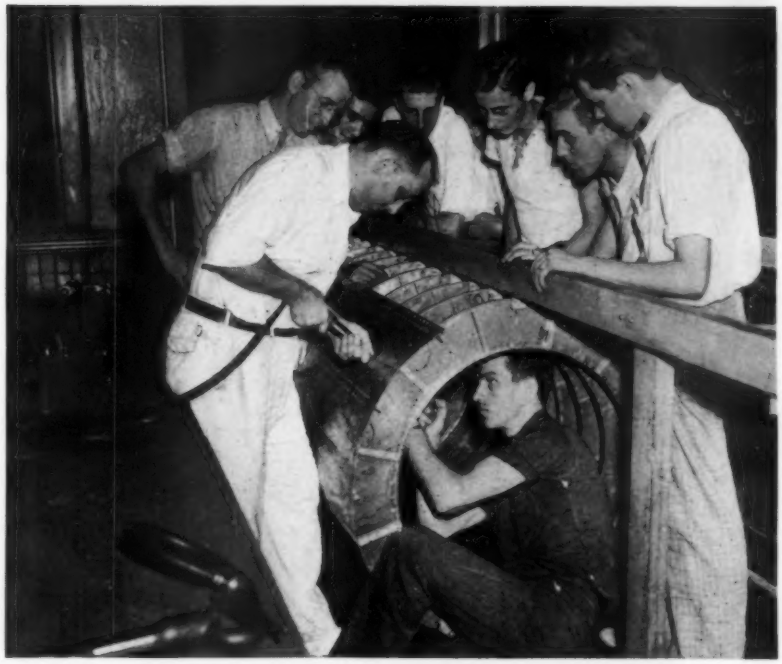
What many people have lost sight of, in face of all the publicity given the direct problems of the Air Corps itself, however, is that the aircraft industry has a serious personnel problem of its own. Swamped by enormous orders from abroad as well as those from this country it, too, has had to expand and with that expansion has come a demand for men.

The industry's problem is, indeed, a serious one and the educational system of the United States has been of very little assistance to the aircraft manufacturers. For years American high schools have been teaching their boys a bit of Latin, a smattering of English literature and a little bit of this and a little bit of that, but not many of them have ever concerned themselves with training boys to use the hands with which they are going to have to earn a living.

Baltimore, Maryland, probably has as serious an unemployment problem as any other major industrial city in the United States. The Glenn L. Martin Company, one of the country's largest aircraft factories, with orders from the Army, the Navy and the French republic, has had to expand as much as any other aircraft plant in the country.

Despite these seemingly happily related local problems, Martin has had extreme difficulty finding properly trained men, or even men with a background which would enable them to learn quickly. For instance, one recent morning some 1,200 men lined up in front of his employment office in search of the jobs they knew were to be had. There was room in the plant for every one of them and more, but when they were questioned only 11 were found to have had training in *any*

Prospective Martin employees are being trained (below) in layout and design. Many of these young men have since been taken into responsible positions in the factory.



Here students are getting practical experience in the riveting of sheet metal.

kind of craft. The others knew absolutely nothing about the use of any tool or machine which would enable them to meet the broad qualifications of a somewhat—at that time—desperate factory.

Confronted with a demand from all sides for aircraft and having ready for use a newly completed factory addition which nearly doubled the size of his plant, Martin began casting about for a method by which he could get the properly qualified workers he desperately needed.

Martin has been progressive, but coldly practical, since the days when he was flying box kites, as his singular success in the aeronautical industry would indicate. He moved to meet his problem in a progressive and practical way, with the assistance of an enlightened board of education whose example might well be followed by other school authorities.

A few weeks ago the aircraft manufacturer revealed that he and the Baltimore school board had been quietly conducting an experiment in vocational education. An experiment, it was brought out, which was instituted on the manufacturer's part in the hope that it would provide him with trained or partly trained personnel and, on the school board's part, in an effort to provide Baltimore boys who might otherwise be walking the streets vainly in search of work with good jobs.

That experiment was a training course at a local vocational high school, arranged specifically to prepare Baltimore boys for employment as aircraft assemblers at the huge Martin plant, which now employs more than 10,000 men. The experiment was such a success that the course will be continued at least as long as there is a demand for skilled workers at the factory.

Martin provided the school-within-a-school with one instructor, all the necessary tools and other equipment. The school board supplied another instructor, class rooms, supervision and the students themselves, while the manufacturers of products which Martin uses donated the materials with which the boys work.

For the original experimental course, 60 boys were selected carefully from the roles of the school board's Public School Placement Bureau. They were to undertake training which would teach them the fundamentals of good workmanship required in any industrial organization and, specifically, the needs of metal shops in other lines as well as aircraft.

The class was run exactly as a factory is operated. The students punched a time clock every morning and every afternoon, "working" a five-day week. Typical manufacturing operations with hand tools were duplicated. The students built fuselages, nacelles and other aircraft parts, although their finished products were not actually used in the construction of airplanes by the company. They learned to rivet dural, turn out ribs and do the other jobs which would be required of them in the factory itself.

School authorities made it clear from the beginning that they would not tolerate an irresponsible attitude. Any youth who showed a tendency to play or take the training lightly, they promised, would be dismissed promptly and be replaced by another from a long line of applicants. Too many boys wanted and needed jobs badly for the sponsors of the class to waste time with triflers.

Happily, only one boy was dropped for failing to adopt the proper attitude. The other 59 are now employed at the plant. Altogether, 108 boys now have completed the training and have jobs at the Martin factory and another 53 youths now are taking the course. By the end of the year, probably 300 boys who might otherwise be pounding the pavements will be earning a good living.

Although the course is being continued as a semi-permanent part of the Baltimore educational system, its length has not yet been decided upon. The original class spent only a few weeks in training, but the ultimate length will rest upon the ability of the first few groups to absorb the necessary knowledge. Those in charge of the school believe that the course probably will require about six weeks.

Apart from feeding him with boys who have a background that will enable them to settle quickly into the highly specialized routine of the plant, Martin is especially pleased with the success of the class because it will help him realize his desire to employ local men as exclusively as he can without hampering the efficiency of the plant.

"The new enterprise continues and broadens our policy of employing residents of Baltimore," he commented, "whenever it is possible to secure from local sources men with experience or ability which meets the rigorous manufacturing requirements of airplane manufacturers.

"Only when we cannot find qualified local men in the line of work seekers which forms daily at our employment office, do we give consideration for factory jobs to applicants from outside the state. I have occasionally heard criticism to the effect that the Martin company imports outsiders at the expense of local labor. Such remarks are based on a failure to understand the intensive inspection which each part and each assembly in an airplane must undergo.

"So rigorous is the necessity in aircraft construction for expert craftsmanship and close-dimensional accuracy that untrained men simply cannot be used."

The new educational system, which doubtless will be followed by other aircraft manufacturers is, as far as the Baltimore educational authorities are concerned, being carried out to take advantage of an opportunity to find jobs for boys who need and want work. The school board has not undertaken the program merely as a convenience to a single industry, but has used that industry's problem to meet one of its own. With many industries requiring skilled craftsmen calling vainly for men, the country's employment problem might be less of a problem were such a practical attitude adopted by other cities

After all, it is hardly necessary to point out, schools are maintained only to enable their graduates to meet life's problems or, in blunter language, to give them a chance to earn enough to support themselves and prevent their becoming public charges. A practical marriage of convenience between school and industry, such as that in effect in Baltimore, certainly would be more satisfac-

(*Continued on page* 88)

The above view is of the new Madison (Wis.) airport and 58 planes that took part in breakfast flight.

ON TO BREAKFAST

RICH man, poor man, beggarman—but no thieves—have banded together in Wisconsin to make aviation as popular a hobby as tourist trips in an automobile. Lawyers, store keepers, clerks, mechanics and even professional pilots are behind a concerted, organized movement to teach the public that flying no longer is an extravagant luxury nor a perilous pastime.

Thanks to the Wisconsin Civil Air Corps, private planes are bobbing up all over the state with amateurs at the controls where formerly the mere mention of airplanes made the man in the street shudder at the thought of risking his life for an expensive thrill.

The corps is composed of men—and some women—from all walks of life and with one purpose: to educate the public on the safety and advantages of flying, either for mere pleasure or for business. The corps has been in existence for six years. Not one of its more than 200 members has met with an accident worse than bending a prop throughout thousands of miles of air travel. The corps often collects its pilots and planes and makes group flights to the various towns and cities throughout the state to demonstrate the logic of the farmer, the butcher, the lawyer, the sportsman and even the common laborer taking to the air as readily as he can step into an automobile and drive off to a far destination. And the corps has demonstrated that the expense involved is very little more than using an automobile—and is much faster. Most of the members of the corps who own planes—and there are about 110 ships listed to date—have adopted the small, low-powered monoplane as the most feasible for private use on limited funds. Many of the pilots are earning no more than $35 a week, yet they have not been pinched by the frequent flights of the corps. And they have been able to purchase their planes as well out of that $35 without sacrificing food, clothing or rent.

This year the Wisconsin Civil Air Corps, whose headquarters are in Milwaukee, instituted breakfast flights to create still more interest in aviation. To date, five such flights have been made, to Madison, Kenosha, Racine and Janesville, Wis., and Chicago. These flights have been made on Sundays when most of the members are not working. The

Gordon Leonard is president of the Wisconsin Civil Air Corps. He is shown below with Mrs. Leonard and their Aeronca in which they took part in record breakfast flight.

At the Madison airport dedication breakfast was served in the main hangar to this large group.

by
HOBART H. STEELY

One of the biggest things in private flying these days is the breakfast flight, which Wisconsin helped pioneer.

pilots have loaded their wives, sweethearts and friends into their ships and sailed away at dawn, reaching their destinations while many families still were getting in that extra hour of sleep on a day of rest. Awaiting the flyers were breakfasts laid out on improvised tables in the hangars of the field where they landed. There have been speeches for the benefit of th public by members of the corps, civic officials and veteran airmen. The programs have been brief but to the point, with aviation safety stressed. The corps on each of these breakfast flights has returned home in time to grab another bite at noon.

On these breakfast flights as many as 58 planes have participated. The last of these flights for the year came in September, when planes outside the Milwaukee area congregated in Milwaukee for an all-day aviation program at the Milwaukee County airport. That celebration followed the mass flight of the corps to Chicago on August 13, when planes from five other states (totaling 101) joined them at the Curtiss-Reynolds airport for breakfast and an informal get-together.

Not all the planes belonging to the members are in Milwaukee. Some are scattered far and close. But officers of the corps in arranging the flights have issued operations orders for each pilot so explicitly that so far, all the planes have reached their destination virtually at the same time without creating confusion. The officers have got things so well in hand that each pilot knows when it is his turn to land and take-off. Safety first is pounded into the members continually and none has forgotten the rules of the game. Should any member show an inclination toward carelessness, recklessness or disregard of the laws of the air, he is dropped. To date, the Civil Air Corps has had no occasion to expel anyone.

It was six years ago that Gordon Leonard, a young druggist, struggling with the help of his wife to make a business for himself in a small store on the west side of Milwaukee, conceived the idea that if a group of amateur flyers could be banded together, aviation in Milwaukee might be made to pay. At that time flying was lagging so far as the private flyer was concerned. There were a few students enrolled with the two principal flying schools, there were one or two clubs composed of five or six men who chipped in and bought a plane to divide among themselves, but there was nothing to boost the little man along and keep up his interest.

Leonard got busy on the telephone and called all the private flyers he knew. Many were without planes, in fact most of them merely were holding licenses and renting planes to keep up their time. Leonard, with the help of the others, drew up a plan whereby the Civil Air Corps was created, a charter drawn and a plan of finance laid out for those who wanted to buy small ships. The corps grew in membership gradually. The dues were only $1 a year, just enough to take care of correspondence and routine matters.

As the plan progressed, the membership was opened to others than pilots. Youths who showed enthusiasm for aviation were admitted to membership. There came a clamor for ground school. The corps instituted elementary schooling in meteorology, aerodynamics, navigation, motors, radio, rigging, etc., at the monthly meetings. Instruction was given free to the members. The classroom work was immediately a magnet. Questions and answers were added to the regular curriculum. Young men and women learned almost as much as if they had paid a good sum to a regular ground school.

Veteran pilots with the corps then began passing on to the amateur pilots lessons they had learned in their many years of flying. The young fellows learned from them what not to do and what to do before they had experienced some crisis in flight that might have led to a crackup. There is no doubt that many of the younger less experienced pilots have found occasions to fall back on the "do's" and "don'ts" in emergencies. That instruction has played a big

part in setting the safety record of the Civil Air Corps.

In addition to the actual flying and classroom work, the corps undertook also the laying out of directional markers on the roofs of barns, buildings and other structures throughout the state for the guidance of private and commercial flyers. An appeal was made to the WPA to help. The Government replied that it could not provide the funds or men for the project due to technicalities of the law.

The Civil Air Corps' next move is to charter chapters in other towns and cities. Madison, Janesville, West Bend, Manitowoc and Fond du Lac, Wis., are possible choices. The corps also has served as a pattern for similar organizations in the Philippines and in Hawaii. In addition to its prime purpose of promoting private flying, the organization becomes a distinct accessory, indirectly, to the nation's defense. By training its members in ground work, the corps is creating a potential pool of mechanics, radiomen, meteorologists and other specialists who would be badly needed by the Army and Navy in times of hostilities. It also could provide splendid pilot material for the military services, obviating the necessity of primary flight training. Advanced flying obviously would be necessary for the pilots, most of whom have not had any Army or Navy experience.

Donald Chase, vice president, is a radio operator with a Milwaukee newspaper. He, too, has made his wife an efficient helpmate on the corps flights. Reginald Schmitz is secretary, Wallace Kennedy treasurer. The board of directors includes the veteran pilot, Ross L. Gardner.

Among members who own planes are Henry Lindner, head of a trucking firm, who flies the fastest ship in Wisconsin, a Howard; William J. Welch, operator of a beauty parlor; Charles Higgins, an attorney; Herbert Westphal, field representative of the A. O. Smith Corp.; William and Robert Gettelman, who build sailboats; Walter Golhler, a barber; Charles Miller, airplane ticket seller at a Milwaukee airport; Reuben Miller, garage mechanic; William Peter, a chemist; T. B. Toll, creamery company employe; Stefan Roth, a meat cutter; Alois J. Gmoser, pilot for an airline, and his brother, Edward, an artist; and Joseph Doerflinger, who is credited with 12,000 hours and having served in the German air force in the early part of the first World War, later flying air mail abroad. Until recently, Doerflinger was a pilot with the Pennsylvania-Central Air lines.

The corps also numbers among its members the only Wisconsin member of the Caterpillar Club, Herman Salmon, who recently was forced to bail out of an experimental racing plane over a Milwaukee airport when the wings buckled.

Among the planes the members are flying are Piper *Cubs,* Stinsons, Buhl *Pups,* Arrow Sports, Aeroncas, Wacos, Rearwins, Darts, Taylorcrafts, Ryans, Standards Spartans, Great Lakes trainers, Fairchilds and Porterfields.

END

Eagle Meets Plane . . .

TWO European sportsman flyers, touring Africa not long ago, brought back the amazing photographs of their mid-air collision with a bird. The bird, a large desert eagle, flew across the flight path of the airplane. Despite efforts of the pilots to bank away from it, the eagle, accompanied by its mate (top picture) followed. As the birds swooped closer the pilots tried speeding up their little plane. At that moment the eagle dived at the ship and struck the left wing. The second bird flew away at the sight of its falling mate. The pilots landed hastily to patch up the damage (below). Note blood and feathers on the wing.

THE THEORY OF GLIDING

by RAOUL J. HOFFMAN

GLIDERS are airplanes propelled by their own weight; or in other words, by gravity. A glider may be called a soarer if its vertical descent is lower than the average rising velocity of the surrounding mass of air.

The ability to glide was the real impetus to the development of man-carrying airplanes. Lilienthal was the first man to make a systematic study of gliders; their design data were mostly taken from sand-loaded bird wings. Chanute, a bridge designer, followed with simplified structural designs as illustrated in Section 2. He aided most of his contemporaries all over the world with expert aeronautical advices.

A large number of experimenters were more or less successful with their gliders. Too many tried to copy the bird in all of its detail—with the exception of the Wright brothers who introduced the warping of the wing for lateral control thus eliminating the necessity of a hang glider. (Section 2.) And, as is known, the Wright brothers used the glider experiment only as a means for developing and building the first successful man-carrying airplane.

Aerodynamic principles used to design an airplane are equally applicable to design a glider, for the vertical displacement of the glider times its weight is equal to the power requireed for horizontal flight.

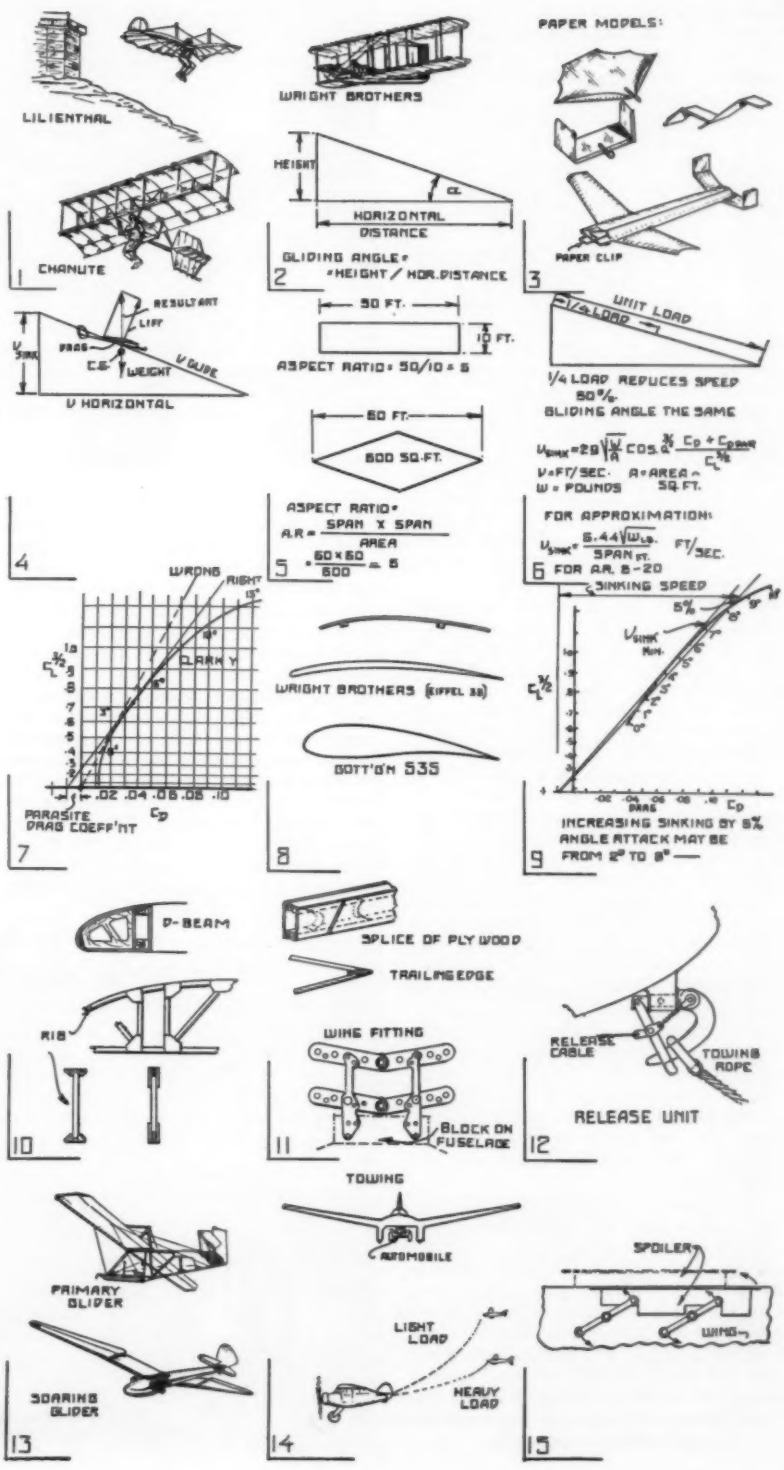
In still air a glider will have a steady downward path; the slope of the glide may be expressed by the angle "a" as indicated in Section 2. However, it is generally given in the ratio of the height and the horizontal distance, called the gliding angle.

A great deal of information may be acquired in making paper gliders; some of these are pictured in Section 3. Especially the lower one will help to study the function of the influencing factors such as the camber, aspect ratio, dihedral of the wing, the tail setting, location of balance and other variables.

The mathematical aspect of the glider problem is very interesting and therefore a few equations will be mentioned to further study in glider designs.

Section 4 shows that in a steady glide the resultant of all air forces must be in line with the gravity line passing through the c.g. (center of gravity) of the glider. For easier calculation the resultant is resolved into two components: the lift component, vertical to the glide and the drag component in line with the direction of glide.

The performances of a glider is affected by various factors, namely the aspect ratio, the wing loading (pounds per square foot), the shape of the body, the tail area and the airfoil section used. Looking at a well-performing glider, we notice its slender wing design; we say the wing has a high aspect ratio. Aspect



ratio is the ratio of the span and the average chord or, if the area is given, the aspect ratio is the span times the span divided by the area. Two examples are outlined in Section 5.

A glider with an aspect ratio of five may have the best gliding angle of 1:11.5 but will have its lowest sinking speed when gliding at 1:11. And, if the same glider wing is increased to an aspect ratio of 20, the best gliding angle will be 1:224 but the best sinking speed will occur at a gliding angle of 1:21.6; the sinking speed improved by 53 per cent.

Nevertheless an interesting engineering compromise may be accomplished by being able to design a glider of low aspect ratio but lighter wing loading that offsets the reduced gliding angle. It has been found that an aspect ratio of 9 to 13 is about the limit of well performing soarers with a sinking speed from 1.8 to 2 feet per second.

To calculate the sinking speed, the theoretical formula and an equation for approximation are given in Section 6. One indicates that the span loading influences the sinking speed; the other shows various factors, especially the airfoil coefficients affecting the descent of the glider. The trigonometric function of the gliding angle may be neglected up to 10°, but the reduced parasite drag coefficient of the body and tail must be added to the drag coefficient of the airfoil. Lengthy mathematical evaluations of the 3/2 power of the lift coefficients may be simplified by laying out the airfoil diagram on a chart having lift coefficient lines placed at the 3/2 power distance, and the reduced parasite coefficient marked on the horizontal line as plotted in Section 7. A tangent to the curve indicates the angle of attack having the lowest sinking speed.

Section 8 shows one of the earliest airfoil designs, the Wright brothers' design and one of the commonly used section for soarers. Other sections are the N.A.C.A. 4415 and 5415; R.A.F. 32, Eiffel 400 and Gottingen 441,549,652.

Section 9 outlines a very interestig phase investigating airfoil sections to be used in glider designs. As previously mentioned, the tangent to the polar diagram of the section is indicative of the sinking speed. In the example the best sinking speed will occur at 4.5 degrees. Increasing the sinking by 5 per cent the angle of attack may be from 2° to 8°. The greater the limits the better is the section. It also indicates that the direction of the wind may vary considerably without affect on the sinking of the glider.

The sinking speed is influenced by the total weight of the glider. Reducing the total weight by 75 per cent, the gliding speed will be lowered by only 50 per cent, but the gliding angle will stay the same. Extra light construction must prevail, plywood of $\frac{1}{16}$ inch to $\frac{3}{32}$ inch thicknesses are used. Waterproof glue for joints, flexible or rigid trailing edges, all-inclosed design without external braces will assure a high perform-

(*Continued on page* 85)

New Tail Wheel Brake

AN inexpensive addition to the present-day lightplane is the new tail wheel brake installation illustrated here. Designed by a New Yorker, the entire new assembly sells for $25, tail wheel and all. Replacement parts for the brake are obtainable at any bicycle store. The new brake is an adaptation of the standard bicycle brake and is made up of many of the same parts. The picture directly above shows how the brake attachment fits snugly into the tail wheel bearing, with a flexible choke wire leading into the cockpit where the pilot controls it (inset). The brake itself weighs seven ounces; the entire assembly, four pounds. To operate the device, the pilot simply presses his thumb on the brake handle. The pilot in the above pictures is Archie J. Baxter, who developed the brake.

British All-Wing Monoplane

LATEST "freak" aircraft design to come from Europe is the all-wing monoplane (below) introduced in London for the first time recently. Known as the Willoughby-Delta *St. Francis,* the new ship is said to be a forerunner of a giant 21-ton airplane built along the same lines. As well as its conventional wing, the *St. Francis* has, in addition, side wings which slant from the main wing back toward the tail. This is supposed to give the design added structural rigidity and efficiency.

AIRCRAFT OWNERS AND PILOTS ASSOCIATION

AOPA NEWS

By GILL ROBB WILSON

ALMOST 2,000 pilots and owners of aircraft now are enrolled in the AOPA, according to a membership report by J. B. Hartranft, Jr., executive secretary. This is a new high for pilot-ownership organization in the United States. There has been no "high pressure" promotion to develop such a united front.

What accounts for it? The answer is self evident—need for *service*. If the AOPA can render service, it will need no form of high pressure promotion. If it does not *serve* non-scheduled flying it will die quicker than last year's movie reputation. And by service we do not mean that the AOPA should be a mere grievance committee or an errand bureau or a sarcastic medium to jibe authority.

The first service the AOPA can perform is one of inspiration. It is we—the pilots—who need stimulation. The following paragraph should be as much of an eye-opener for you as it was for us when we dug out the dope.

Non-Scheduled Declines

Miscellaneous flying consumed less aviation fuel in 1938 than in 1932! Scheduled operators burned twice as much fuel in 1938 as in 1932 and the Government burned more than twice as much in 1938 as in 1932. In 1932, *miscellaneous aviation* consumed 10,293,599 gallons and in 1938, 10,201,053. That is going backward!

Note that, if the 10,000 aircraft of 1938 actually did exist and flew, each aircraft burned on an average of 120 gallons per year. If these aircraft averaged five gallons per hour fuel consumption, each was flown just 24 hours per year. One day out of 365! If 25,000 pilots flew these aircraft, each pilot throttled less than 50 gallons of fuel per year. If he burned five gallons per hour, the average pilot out of 25,000 flew less than 10 hours per year.

If the flying time of the average pilot was down around that figure, is it any wonder that 70 per cent of our crack-ups in miscellaneous flying are due to "pilot error"? Is it evident why the insurance companies' actuaries turn a jaundiced eye upon our pleas for lower premiums? If the average pilot flies so little, is it any surprise that the manufacturer agonizes over safety gadgets? Of course, the ever-increasing crop of light airplanes consume less fuel per hour, but the foregoing is nevertheless a striking set of circumstances.

If the average aircraft is flown so little, *the greatest cost of ownership and flying is depreciation.* Nobody can lower that cost but the pilots themselves. Lethargy, disuse and stagnation of flying activity is what makes flying expensive, dangerous and limited. We know that operation costs for aircraft are less than for power boats. Yet there are hundreds of boats for each aircraft. The light aircraft of today compares in operating cost with an automobile, yet there are thousands of automobiles to each aircraft. We know that an *active* pilot is safer in the air than on an average highway. Yet we have far too many accidents.

The first real, basic, essential service the AOPA has to perform is the stimulation, the rejuvenation, of the American pilot fraternity. *Occasional* flying is expensive and hazardous. *Regular* flying is cheap, safe and constructive. *If the average pilot flew 10 times more than the average quoted above, the number of accidents and the cost of flying would be cut in half.*

The Aircraft Owners and Pilots Association can hammer on research, utility, economy, safety and simplicity of regulation until it outdoes Thor himself, but if it cannot coax, vex or inspire pilots to fly, it has wasted its energy. We want to serve aviation. We want America to be strong in the air. Our first responsibility is simple—get out and fly! Bunch up and go places. It takes active will-power and energy to make your decision. Are we really flyers or do we just like to wear pins and have people think we are "different". The AOPA is out to see that we burn a million more gallons in 1940. You might be interested to know that airline flying consumed 45,310,192 and the Government 44,937,128 gallons last year.

Manufacturers Can Help

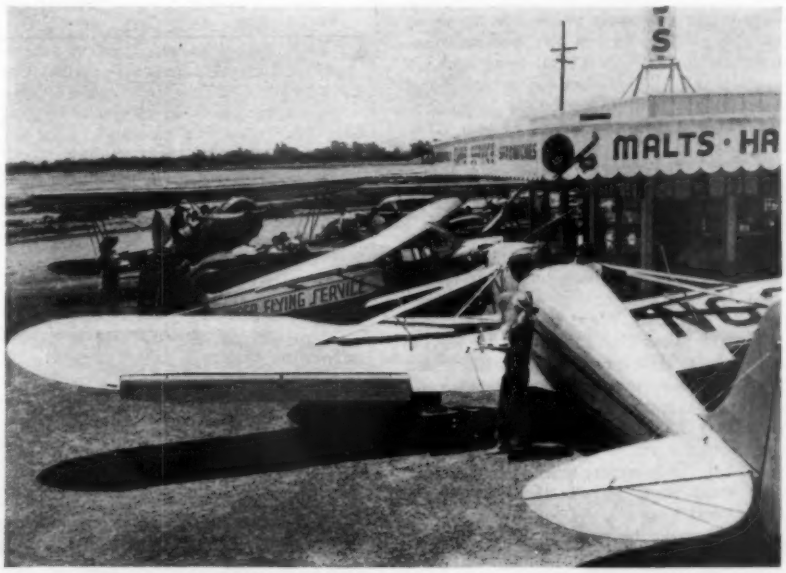
The AOPA wants a maintenance and inspection manual issued with each aircraft. The Douglas Company has this constructive practice. For years we have watched the inspectors consult their little black books, then go after our ships like old bird dogs. We used to think that book was something "for men only" and maybe we were just not old enough yet for a peek. They finally let us in on the secret that it contained information on where to look for trouble in any and every aircraft. We didn't see then—and do not yet—why that information is not the rightful possession of every pilot. There must be some points in every aircraft that are less perfect than other spots. Manufacturers should take pilots into their confidence and tell them where and how to inspect the ships bought from them. The average pilot-owner knows little about how to thoroughly check his ship. Pilots need a lot of education and manufacturers can make loyal and devoted customers by helping care for their aircraft. A sound manual will do the job.

Weather and Pilots

The old system of weather information distribution was geographical. Some time ago the distribution was shifted to a "group sequence" basis. The shift worked a hardship on miscellaneous aviation. Recently the CAA has been holding a series of conferences on a modification of the distribution system. The AOPA was asked to "sit in". The solution arrived at is a compromise of methods and we think will be much more satisfactory to non-scheduled and scheduled flying alike. Earl Ward of the CAA, who handles these matters, is one of the most considerate and hardest working men in aviation.

The Optimists' Club

The guy who tells us "a thousand feet and two miles at the airport" when we're



Charles Brown, operator of a San Diego drive-in lunch stand near a local flying school, started something when he dared a pilot to drop in for lunch. Six ships showed up and have continued coming. Service by pretty waitresses is reported prompt.

in the soup at 500 and can't see anything but a dim red glow from the neon sign at the airport restaurant, is an optimist. He is also something else when he insists that no matter what we can or cannot see, the weather is officially "a thousand feet and two miles". What we want to know is how low do we have to come to get the benefit of this official weather. To be frank, we do not believe there is a predictable weather report which means anything —not anything—when it gets down to terms of *less than 500 feet and two miles.* Nothing is more disconcerting than to find a stray 500-foot ceiling lying on the floor. We're for optimism, but not official optimism. We want our weather reports officially and pessimistically accurate.

Instructors Wanted

There is a surprising shortage of good instructors. There always has been, but nobody found it out until the Government assumed the responsibility of starting a civilian pilot training program. From this point on there will be a career in aviation as a "Flight Instructor". This old business of some half-trained pilot passing his ignorance on to others is past. Many a trusting aviation club has lost its equipment and its members via the coroner because it let somebody build up "flying time" in exchange for "instruction". *The best instruction is cheapest in the long run.* Some of the smarter flying clubs along the airlines are lucky enough to wheedle some good airline pilot into taking them under his wing. We hope the airlines will look with favor upon such arrangements, for it makes a splendid ground for common understanding.

AOPA Member Wants Job

He is a thoroughly trained business executive of unusual experience. He came down this afternoon to discuss the possibilities of his talents in aviation. The sum and substance of our advice was: No job in aviation is any good unless it is a job you yourself created. We need men who have capacity to apply aviation to the work of the world. Survey the national distribution firms. Get the salesman and his samples into the air. Get the surveyor and the engineer and the produce buyer upstairs. The "Executive Ship" of tomorrow is a glorified Cub *Coupe,* an Aeronca, Stinson "105", Taylorcraft or Luscombe.

Out of our conference this AOPA'er dashed with an idea he suddenly thought of. If you find the Fuller Brush man or the bill collector phoning you for a date at the airport, don't blame us. Our friend is on his way.

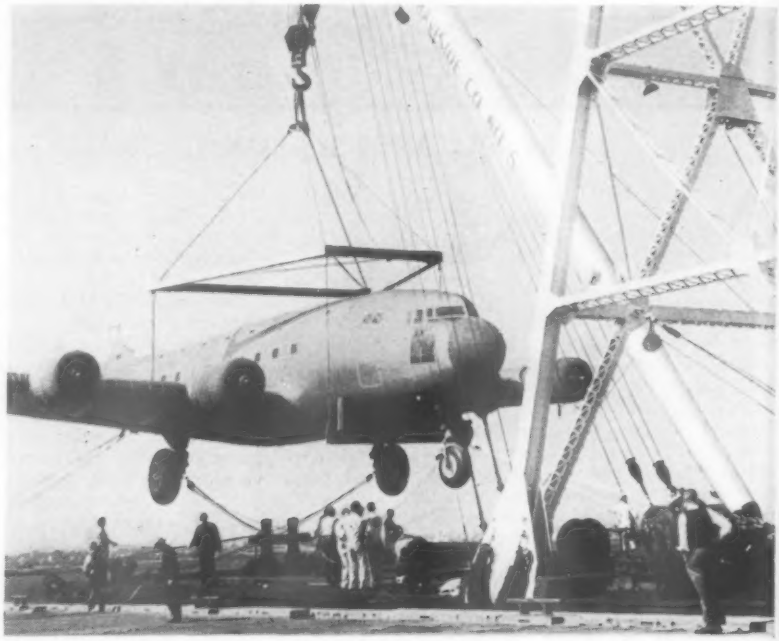
Members Want to Know

Student pilots claim they can get higher marks in examinations on air traffic rules and regulations than they can in meteorology and navigation because, in the former case, they have the information properly organized for study. The examinations are very stiff. Only expert teaching could prepare some pilots to pass them. We have few expert teachers.

Would it not be common sense for the CAA to prepare a bulletin containing some 500 questions on meteorology and navigation, out of which questions the tests would be selected? Such a procedure would or-

(*Continued on page 62*)

DC-4 Off For Japan



THE crane above is lifting the prototype Douglas DC-4 off American soil for the last time. When this picture was taken, the giant four-engined airliner was being loaded aboard a freighter bound for Japan where it is to be delivered to Japan Air Transport, its purchasers. The ship was sold to the Japanese for a price said to be in the vicinity of $700,000. It was reported that the cost of shipping the DC-4 to Japan was approximately $50,000.

The Japanese airline bought the huge transport following exhaustive and extensive tests by Douglas and airline engineers. Just prior to its sale it had returned from an elaborate transcontinental tour, mostly under the auspices of United Air Lines. Incidentally, United recently placed an order for six DC-4's and delivery is expected to start some time in the spring of 1941. The DC-4 is powered with four 1,500 h.p. engines and carries 42 passengers.

Bellanca's Newest

AFTER an extensive period of preparation and testing, the Bellanca Aircraft Corporation has received its Government approval of its Model 14-9, popularly known as the *Cruisair.* Now on the market at $3,795 (at the factory), the *Cruisair* is a three-place low-winged cabin monoplane designed for the private flyer. It is powered with a 90 h.p. LeBlond engine which gives the ship a sea level top speed of 133 m.p.h. and a cruising speed (75 per cent power at 3,000 ft.) of 120 m.p.h. Range is 420 miles, its service ceiling is 14,000 feet and landing speed is 47 m.p.h. Fully loaded, the *Cruisair* weighs 1,700 lbs. Wing span is 34 ft. 2 in., length is 21 ft. 3 in. and height is 6 ft. 3 in. The landing gear is retractable. Not ordinarily seen on landplanes are the two auxiliary vertical fins that are standard equipment on the *Cruisair.* Test pilots, both of the manufacturer and the CAA, found that addition of these fins precluded the possibility of spins out of any normal maneuver.

RETRACTABLE WING

by ROBERT ARENTZ

Perhaps this airplane will revolutionize aviation. It could with its almost unbelievable performance.

INCORPORATING a radically different wing design, a sturdy little airplane with amazing performance records has recently completed a year and a half of successful test flying. In looks and in general construction there is little to set this tiny plane aside as an outstanding development in future aircraft construction.

Seen resting on the ground, or flying in the air, it seems to be just another well-built experimental airplane. But when Earle Hansen, veteran racing pilot and aeronautics instructor at the University of Idaho, lovingly pats the sleek side of the fuselage and tells you of the performance figures of the tiny plane, you look askance at him and are liable to wonder if you are being gently ribbed by an expert kidder. But the figures are down in black and white. The little ship is a performing fool.

The idea behind the construction of this new wing design is not new; it is as old as the practical theories of flight. Many men have worked on it and fortunes have been spent in research. The idea always has been sound. Many variations have been built; a few patents granted. None of them worked in flight tests.

It remained for two western airmen to solve the problems of weights and stresses—Con Ellingston of Great Falls, Montana, and Hansen, who has done the test flying and who lived in Great Falls at the time the ship was built in the back end of a garage there.

Protruding from the fuselage on each side is a strange looking wing arrangement. These stub wings have external bracing in the form of fins running from the leading edge of the wing to the trailing edge. Continuing on to a full wing span of 32 feet, the main wing of the airplane slides inside of the externally braced stub wings. Here lies the secret of the speed, take-off run and rate-of-climb figures that are so hard to believe.

The ship is powered with a 90 h.p. LeBlond, air-cooled engine. A wooden fixed-pitch propeller has been used on this first model, though a variable pitch is needed to completely utilize the efficiency of the design. As the take-off run is started, the observer notices how soon the airplane leaves the ground and how rapidly Hansen climbs for altitude. To use a cliche, "it climbs like a homesick angel."

As with any plane built to have quick take-off and fast climb, the forward speed is about on a par with other craft similarly powered. Top speed is approximately 110 m.p.h.

But then, as Hansen kicks the little ship around in a vertical bank and drops the nose closer to the ground, a strange phenomenon takes place. The gangly wheels no longer hang down; they fold snugly into the belly of the airplane and almost at once the wings shorten noticeably. In one simple operation the pilot has clipped seven feet from the overall span of the wings by simply working the mechanism that telescopes the main wing into the steel stubs on each side of the fuselage.

The Ellingston Special is shown above with its wing partially extended and, directly below, with the wing retracted. The fixed center section is built onto fuselage.

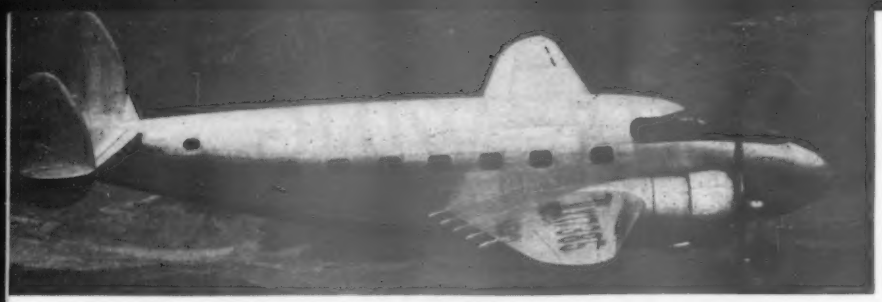
Here the novel ship is propped up to show it with wing and landing gear retracted. Using a 90 h.p. engine, top speed with the wing retracted is just under 170 m.p.h.

Hansen is no longer flying a fast climbing airplane with ordinary forward speed. Instead, a furious little clipped wing racing job flashes back across the field. With the engine howling, the ship careens along tail high. As the end of the mile test course is reached, the wings again spread outward and the ship is hanging on its propeller while it bites up through a thousand feet of air in less than a minute's time.

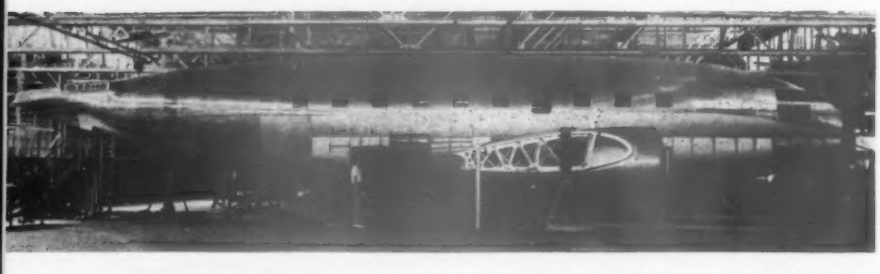
The timer checks his stop watch, figures for a moment with a pencil and then shakes his head with disbelief. The return run, without a breath of air stirring on the Great Falls airport, has been just under 170 m.p.h. That

(*Continued on page* 83)

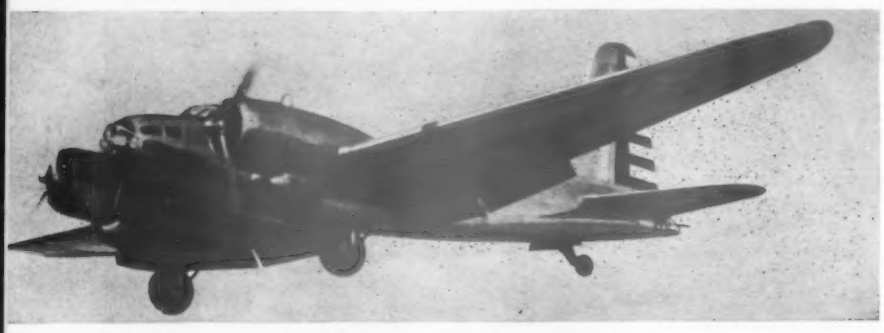
HAVE YOU SEEN ?



Newest Lockheed airliner is the "Lodestar" (above). It is powered with two 850 h.p. engines, carries 14 passengers and crew of three. Top speed is 236 m.p.h., cruising 220. The model already is in production, Mid-Continent Airlines having bought first three.



Nearing completion in the St. Louis plant of the Curtiss-Wright company is the CW-20 transport. Though powered with two 1,600 h.p. engines, the new ship is intended to carry 36 passengers. Designed for sub-stratosphere flying, its speed will be 237 m.p.h.



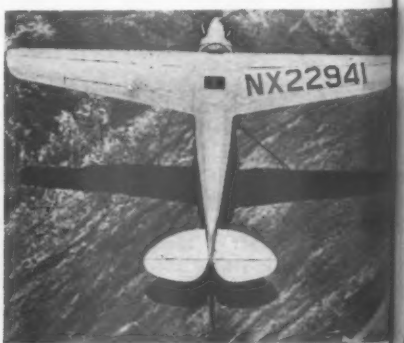
Latest U. S. Army bomber is the Douglas B-23 (above). Somewhat similar to the familiar B-18 model, the B-23 is the latest Douglas design for the Air Corps. All specifications and performance data are being withheld at the request of the War Department.

An enterprising golf driving range owner near Minneapolis arrived at the above solution for protecting his customers from mosquitoes. The prop blast routs the pests.

Howard Hughes was hoping to fly his $250,000 Boeing "Stratoliner" to Europe through the stratosphere, has been delayed by the war. He may try a transcontinental dash.

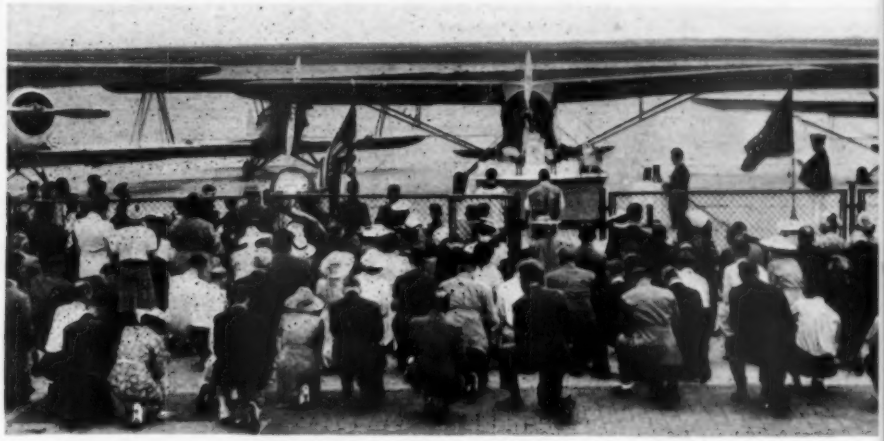
Have you seen this airplane before? A Canadian reader sent it in, seeking to identify the ship. Can someone help?

The Piper Aircraft Company has been experimenting with the taper-winged Cub below. The wing includes slots and flaps.



The novel instrument above is a "flying time alarm clock", invented by New York pilot. Bell rings when paid time expires.

A new primary trainer for the Army Air Corps is this St. Louis XPT-15, powered with a Wright engine. Built by the St. Louis Car and Foundry Company, this trainer is expected to be used in the Army's new nationwide training program now under way.

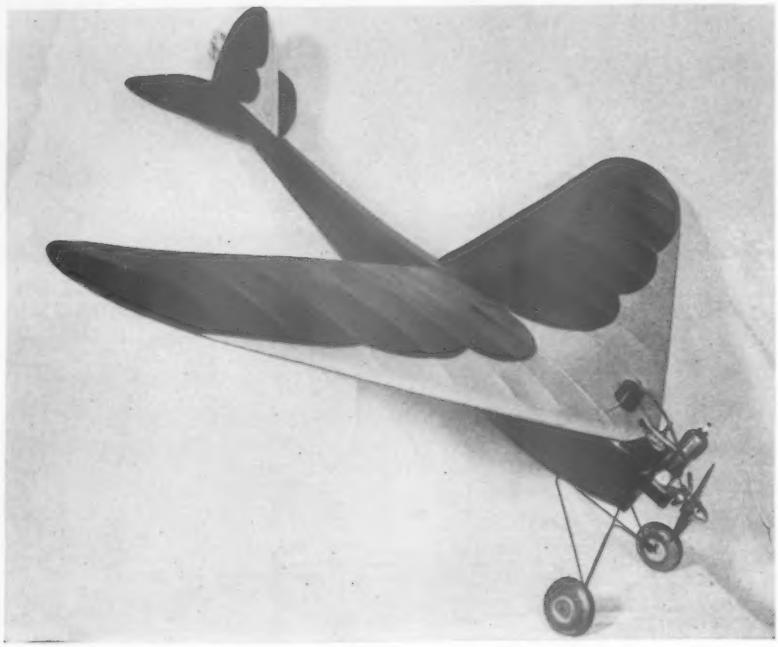


The Catholic Airmen of America recently held a "commemorative mass" on the apron at Floyd Bennett Field, New York. The first of its kind ever to be held in the United States, the airport mass was attended by approximately 250 airport workers and pilots.

The bomber below is not a Nazi. It is Finnish. The Finns have been using the swastika since late in 1918.

The trim monoplane above is the Curtiss-Wright CW-23 export two-place fighter, powered with a 600 h.p. engine. This design is similar to Curtiss' powerful interceptor.

Latest Spartan design is this NS-1 primary trainer. Built in connection with the Spartan School of Aeronautics at Tulsa, Okla., this ship uses a 220 h.p. Lycoming.



The P.A. Special is an unusual combination of flying wing and standard airplane.

THIS MONTH'S MODEL

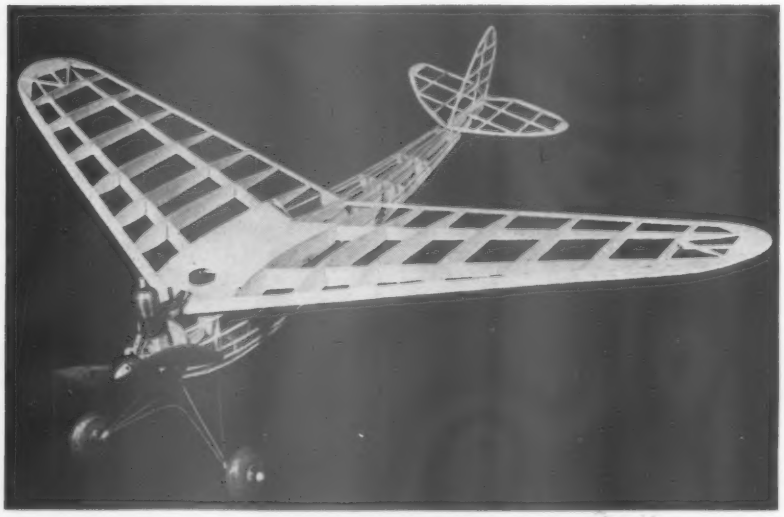
by PAUL W. LINDBERG

Model Editor and Designer

THE P. A. Special was primarily designed for unusual flying ability. The design as a whole is very simple in its construction and the model can be built in a remarkably short time. Motor and ignition unit are so situated that they may be easily checked and repaired.

Any color scheme may be used. However, for the benefit of readers, the particular model shown here was colored black and trimmed in orange. It may be powered with any 1/7 h.p. motor.

By enlarging the plans four times the size shown here with an ordinary pair of dividers, the correct size will be had for completed model appearing in this article. Weight of this model ready to fly should be approximately 18 ounces. Our model weighs **exactly 18 ounces.** However, this weight will vary slightly due to different type motors used.



This is the model before covering. Note strong wing and unusual center section.

Construction of Fuselage

Method of construction used here is of the keel and former type. The keel is made from ⅛ inch thick hard balsa. Next cement all formers, which have been cut from 1/16 inch sheet balsa, in their proper positions. Then attach the firewall, which is cut from 1/16 inch veneer. All stringers are made from 1/16 inch x ⅛ inch strips. In placing these on the fuselage, it is very important that they line up properly from front to rear. Eliminate any irregular curves which might occur in fastening the stringers to the formers so that a first-class covering job may be had.

Landing Gear

From 1/16 inch O.D. spring tempered steel wire, form the landing gears to their proper shapes. They now are ready to be cemented into the fuselage. Reinforcement blocks are used at the various junctions where the landing gear ties in with the fuselage. Use cement excessively at these points as a great deal of strength is required here. Where wire landing gear comes together to form the axle for wheel, the best method for binding these together is to fix them with copper wire and solder.

Elevator and Rudder

These both are built of the flat section. Very little is to be said about their construction, as they are probably the most easily constructed parts of the model. It is suggested that you pin them down upon some flat surface while cementing, in order to prevent any warping.

Construction of Wing

The wing is of the cantilever construction and requires little more work to make than the ordinary straight wing, but the added performance and appearance one gains from this type of wing makes it well worth while to construct. From 1/16 inch sheet balsa cut the various ribs, with the exception of ribs "A" which are made from ⅛ inch sheet balsa. Next to be cut to shape are the spars, leading and trailing edges. The various parts now are cemented together so as to form two separate panels. Wing tips are made from sheet balsa.

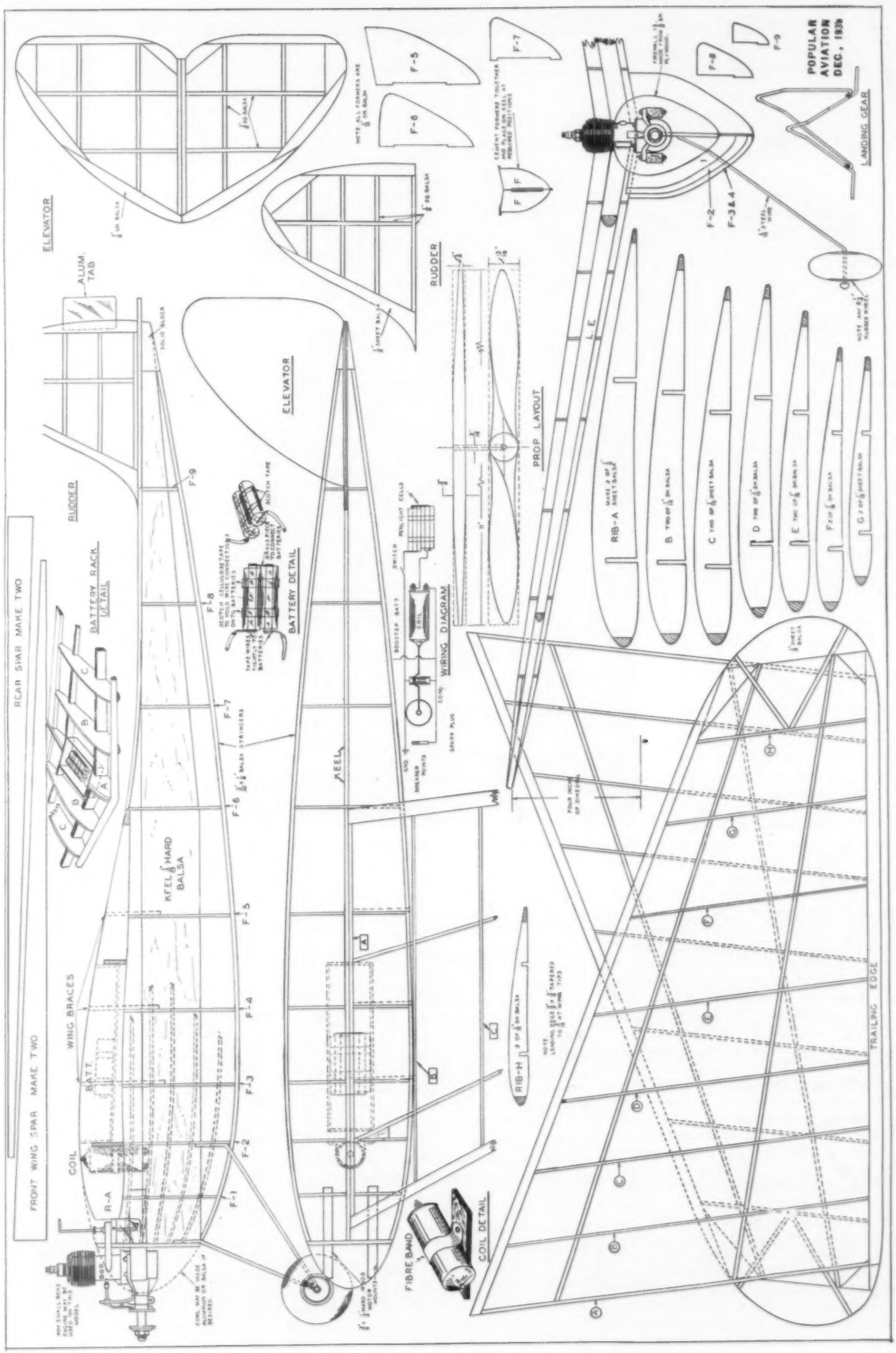
When the two halves of the wings have been completed they are blocked up to the proper dihedral angle and cemented together at the center. Note the short reinforcement spars at center of wing.

Framework of wing is next cemented securely to top of fuselage. Provisions for battery rack now are made. Motor mount and other small details are clearly shown on plan and, if studied carefully, no trouble should be encountered here.

Covering the Model

Secure three sheets of bamboo paper and some airplane cement and dope. As bamboo paper is much heavier texture than the tissue, it is necessary to thin down regular airplane cement slightly so that the bamboo paper will adhere properly to the framework. Do not attempt to cover the fuselage in too large a piece. Best results will be had by covering only one stringer space at a time, working from front to rear.

(*Continued on page 74*)


POPULAR AVIATION DEC., 1939
ELEVATOR
ALUM. TAB
RUDDER
BATTERY RACK DETAIL
REAR SPAR MAKE TWO
FRONT WING SPAR MAKE TWO
WING BRACES
KEEL & HARD BALSA
BATTERY DETAIL
WIRING DIAGRAM
PROP LAYOUT
LANDING GEAR
TRAILING EDGE
COIL DETAIL
FIBRE BAND
RIB-A
RIB-H
F-1
F-2
F-3
F-4
F-5
F-6
F-7
F-8
F-9

We Czechs Are Flying for France

(*Continued from page* 21)

at the various acrobatic competitions around Europe.

His skill with an airplane is very great. He flies beautifully and brutally, as all acrobatic pilots must fly at times to show their complete domination of their machines. He has been improving his showmanship in the last two years and actually won on points the last international acrobatic competition in Paris. Because of politics, however, he was given second prize and a German flyer awarded first place. No matter, our colonel will show his skill in the war. You do not win real air battles with political arguments. Hot air and politics have little effect on a bullet once it is launched at its target.

Novak and Ambruz are great friends. They also are wise in the slow, clear-sighted way of pilots. Very quietly they talked things over between themselves as they saw the rise of Hitler and Naziism in Germany. When Hitler began his series of bloodless coups they decided to act. And by that time they both held responsible posts in our national air force and could command the respect and affection of nearly every flyer in our aviation units.

When Austria was gulped by the Nazis they began talking to the comrades they could trust the most. Gradually the word spread through our units until there were 814 of us in all pledged to maintain our personal standards no matter what happened. Few of us realized, when we first swore allegiance to our colonels, that we would ultimately come to trust them more than our own general staff and our government.

"Wow! I'll bet we look just like a magazine cover! . . ."

I often wonder now just how far ahead they were looking at that time. Some two years ago, when our conspiracy was just a sort of joyous prank, I think they did possibly see what was coming—otherwise how could their preparation have been so thorough. At any rate they began talking to a few French officers. Each time they went into France they appeared at the air ministry in Paris. It looked as though they were merely being polite—making their bows to the ranking authorities. Actually they were laying the foundation for our participation with the French air force today.

Early in 1938 things began getting difficult at home. The Sudeten Nazis, who had been with us for years, suddenly began making a lot of noise. There were demands of all sorts, silly and unreasonable demands. The favorite German question of minorities was raised. We began to smell Hitler's hand in all this and our government—at first—was very firm about it all.

But the disorders and disturbances continued. The Sudetens elected national representatives. The question became acute. Germany began to make representations and the whole sordid mess was on. You know all about how this went.

For us pilots there was the usual day's work. We checked our motors, flew our formations, held tactical maneuvers, target practice, worked with our artillery, carried the politicals to and fro upon their missions and generally kept our mouths shut and our eyes and ears open. But among ourselves we talked. For a while we believed that England and France would stand by us. And we counted on Russia. That's especially amusing now, after the astonishing happenings of recent weeks. We thought we could tell the Germans to go hang and they would take it.

Suddenly we got orders to begin daily patrols along the Sudeten border and over our secret forts there in the mountains. They couldn't have run over us like they did over Poland. Their mechanized forces would have been lost against us there. We were in a good position and our chaps had their hearts strong. We were good soldiers and we knew we could give a real account of ourselves if it came to a fight.

Then we heard about England's betrayal. Chamberlain flew to meet Hitler. An Englishman flying to Germany. Not calling the German to London for a conference. We knew we were lost and alone. Even then we didn't care too much. We were strong and we thought that if our government fought the others would have to move in.

But Ambruz and Novak weren't fooled. They had laid their plans. Then they got them into operation. One man was detailed to collect the latest maps of Hungary, Rumania, Bulgaria, Jugoslavia and the newest mosaic maps of Czechoslovakia and Poland that we had just made. Another man got the secret plans for the breech of the newest Skoda anti-aircraft gun. Still another of our members, the armament officer for the entire air force, got the detailed drawings, dimensions and patterns for the Zbrojovka-Brunn machine gun. This is called the Brenn gun in England. It is the lightest, simplest, fastest-firing and most rugged machine gun in the world today.

Finally our colonels themselves got the Czech army codes and secret ciphers, the lists of secret army ammunition, fuel and arms stores and the plans of the Sudetenland forts and the secret mines and tank-traps along our frontiers. All this material was gathered close at hand in readiness for we knew not what.

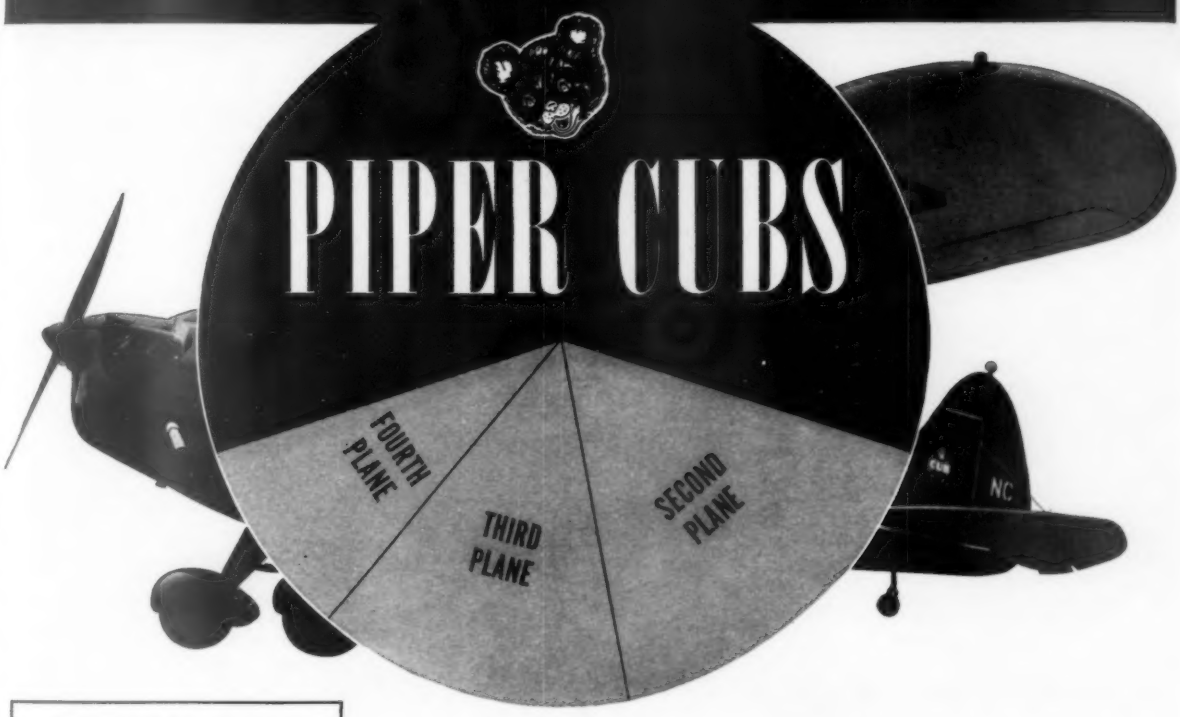
Then, on March 13, we learned secretly that the second government had sold us out. There was to be no war. The Germans had won. England and France had deserted us. So we systematically began flying our latest types of fighters, bombers and reconnaissance airplanes to Polish military aerodromes. In the airplanes we placed all our secret information and our plans, blueprints and photographs. More than 600 of us got away before the morning of March 15, the day the Germans started to march into the Sudetenland. For the rest of us that was a busy day. My own particular duties involved flying an Avia plane to a Polish military field just across our northern border. Before I was to get away, however, I had one other duty to perform. My job was to open the cocks and start the pumps to dump all our fuel supplies at the military field of Ruzyn so that they could not be used by the oncoming Germans.

Our little country had known for years of her precarious position and our general staff was not blind. Czechoslovakia, my lost country, had collected many essentials of war. Some materials we had in sufficient quantities to last us for three years of conflict. One of the items was fuel. We'd collected enough hightest gasoline and lubricating oils to last us for one year of war—or so we had calculated. Most of this was stored in deep underground tanks at our military airports. We decided to destroy it.

I'll never forget the morning I was to leave. I went with my mechanic to the storage tank pumps. They were started and I opened the valves that allowed this vital fuel to flow out into the airport. Immediately afterward we taxied out and flew away. We were, so I understood, the last ship to leave this airport. An hour later, from some cause we never did learn about, a terrific explosion occurred here practically destroying the hangars and machine shops.

(*Continued on page* 60)

Do You Know That You Are Buying More Cubs Than All Other Light Planes Combined?



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DURING the first nine months of this year more Piper Cubs were purchased than all other light planes combined! And Cub unit sales represented approximately 60% of the total of the four leaders! Why this overwhelming preference? Because a Cub-invested dollar gives you a combination of superior performance, greater power, faster take-off, easier landing, more comfort, greater safety, finer appearance and longer mileage than any other plane-invested dollar—bar none! . . . Piper Cub models include Continental 40 h.p. Trainer at $1098 (only $366 down), Franklin or Lycoming 50 h.p. Trainer at $1298, Continental 50 h.p. Trainer at $1450, Lycoming 65 h.p. Coupe at $1910 and Continental 65 h.p. Coupe at $1995. All prices F.A.F. Lock Haven, Pennsylvania.

Visit Us at the San Francisco Fair and the Cub Factory

COUNT THE CUBS THE WORLD'S FASTEST SELLING AIRPLANE

(*Continued from page 58*)

And the explosion was followed by a terribly destructive fire.

I swear that we had not planned this destruction nor had we planted the delayed mines that would have caused it. I believe that inexperienced civilians came to the field and accidentally ignited the fuel that was pouring into the flying area. Once this was ignited nothing could have prevented the disaster that followed.

When I landed in Poland I was immediately placed under arrest. We were met by armed guards. They showed us where to stake down our plane alongside a number of other Czech planes—there were 60 of us that landed at this particular Polish aerodrome—and led us to the guard house. There I found my comrades in force. There were 80 of us there. And in conversations I heard that of our 800 we had been directed to go to a dozen or more fields. Our colonels, considering the facilities at the Polish aerodromes, had split us into a dozen units.

I also learned that pilots had destroyed fuel and bomb supplies at every other flying field in Czechoslovakia. And they had left for the Germans only a few obsolete and slow airplanes that could not be used in war or even safely in training. We did a thorough job and we were almost hysterically happy about it. We laughed and sang and joked until even the sour-faced Poles thought our stunt was funny.

The next day we were allowed the freedom of the post. We heard then that our colonels had been in direct communication with Paris. Their spadework with the air ministry in France was bearing fruit. Soon the Poles began to treat us with the utmost consideration—we were given officers' quarters and good food. We were told that the French general staff was communicating with the Polish general staff about us.

Two weeks later we were ordered to fly our planes to Gdynia, the Polish port on the corridor. There we dismantled our planes, crated them for shipment and went with them in French and Dutch freighters to Bordeaux. There we were met by the French who received us with open arms. We were given mechanics to reassemble our machines and then we were gathered together at a great French military field in southwestern France.

One by one, we were sworn into the French foreign legion—all aliens at that time were put into the legion—and then we were sent to Africa. We barely landed, however, before counter orders brought us back to France and put us into the French aviation schools.

All of us Czechs were put to work assisting the French military instructors in training young French military pilots. It was important work and we knew it. We entered with a will, for the French, even then, were promising us a crack at the Nazis ere long. Our secret information, maps, blueprints, and plans for the guns were gladly received. We understand now that there are four factories in France busy building the types of guns described in our drawings. They are supposed to be very superior to the older types of cannon used by the French up to now.

Not long ago I saw Colonel Novak for a few minutes one morning on the airport where I am acting as instructor. It was the first time in months. He greeted me with a handclasp and we talked soberly of what we had done.

"Tell me," I asked at last, "how many others had to dump fuel and explode munition dumps?"

"Oh, there were 50 or more of you given special jobs," he replied. "We picked our steadiest men. We probably cost the Germans 20,000,000 gallons of gasoline and oils and 1,000,000,000 francs worth of ammunition. But that's just the beginning. We'll cost them more in lives if we get our fellows together as a Czech wing. That's what we're trying for now."

". . . It was just a hunch . . ."

It now appears that we'll get together. Minister Osusky, who was the Czech ambassador to Paris, is organizing a Czech legion to number 50,000. They'll all be refugees and he has agreed to take the responsibility of investigating every man. He expects to check each new refugee volunteer with men from his neighborhood in Czechoslovakia. This is necessary because Germany sent into France several hundred spies disguised as Czechoslovakian refugees after taking over the country. We want no spies in our legion.

If it materializes, the pilots will be brought together to serve as one wing under their own leaders, we are told. Thus far we have been scattered through the French squadrons. Some of us are in the reconnaissance and fighter unit.

We hear strange stories from friends and acquaintances left behind in Czechoslovakia. There were some 1,500 reservist pilots who didn't come with us. Probably they would have come but we had no way to get them out. Anyway we hear that these men are being forced to fly German airplanes with German crews. The Germans are told to shoot the Czech pilots at any time they commit any act that would indicate they are trying to escape or disobey orders.

We've heard other stories about the Gestapo torturing Czech pilots in order to learn the hiding place of secret arms stores and munitions stores, some of which have not yet been found by the Nazis. One story is about a friend of mine, who was beaten daily for 10 days before he agreed to show a secret fuel dump. He was accompanied to an airport by a number of high Gestapo and army officers and a strong guard. My friend walked out on the airport and stopped. When he was surrounded by the Nazis he said: "The fuel is here," and he stamped his foot on a little stake that was there. Instantly there was a terrific detonation. He had exploded a hidden mine set before the Germans arrived in the country. My friend was instantly blown to bits but with him were 67 Nazis, among them his chief torturers and tormentors.

Another tale concerns a former Czech army officer who was being used as a machine gun instructor by the Nazis. This officer had an accident with a machine gun and as he bent over the mechanism to repair it a Nazi officer kicked him in the side and knocked him to the earth. He jumped up and slapped the Nazi's face, whereupon the Nazi jerked out his automatic pistol and shot the Czech dead.

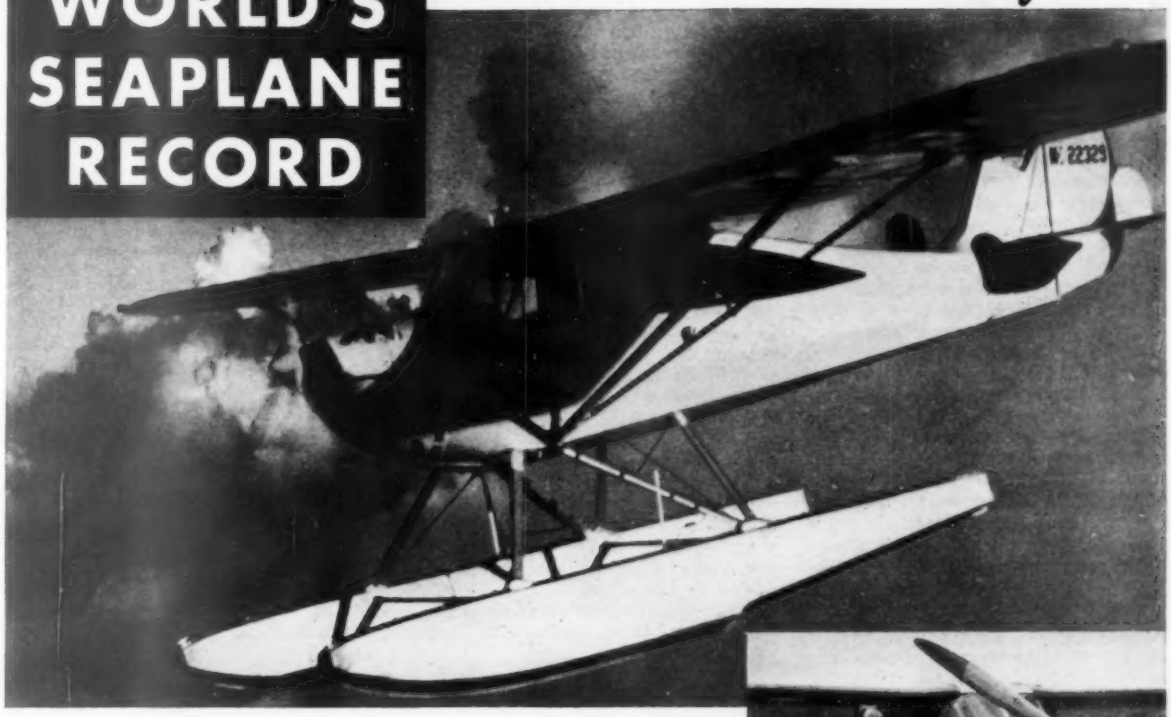
Three hundred yards away two other Czech officers, also machine gun instructors, saw the whole incident. Ten minutes later these men by mutual consent suddenly turned their guns upon the Nazi officer and a detachment of men he was commanding. They riddled the squadron killing 28 men. Then the Czechs committed suicide.

We can't say the tales are true but they sound like our people. Believe me when I say that I do not envy the Germans who are attempting to rule our Czechs. We're doing our part on the West Wall. They're doing their's inside Czechoslovakia.

END

NEW WORLD'S SEAPLANE RECORD

NEW YORK TO NEW ORLEANS
Non-Stop — Non-Refueling in the Aeronca "Chief"



WORLD'S *Champion* OF LAND AND SEA

Here are the Facts:

PILOT—HENRY CHAPMAN. **SHIP**—AERONCA "Chief" 65 Continental Powered Seaplane. **TAKE OFF**—Oct. 12, 6 A. M. E. S. T. NEW YORK CITY. **LANDING**—6:30 P. M. C. S. T. NEW ORLEANS. **DISTANCE**—1186 MILES. **TIME**—13½ HRS. **AV. SPEED**—88 M. P. H.

Aeronca does it again! First in the air—land or sea. Holder of the world's land light plane distance record made by Johnny Jones in his sensational coast-to-coast non-stop, non-refueling flight—and, now, the important seaplane record. Here's proof of Aeronca's engineered stamina and flyability—proof of superior craftsmanship and performance which has won the favor of so many leading operators and sportsman flying enthusiasts. Aeronca's the choice—wherever you go.

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District Manager for Aeronca at New Orleans, Henry Chapman gets the praise and plaudits of everybody associated with the Aeronca organization and the aviation industry. His great ability and far-sightedness is typical of all Aeronca men—the willingness to help establish facts by flights that prove the dependability of low-cost flying.

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AOPA News

(*Continued from page 52*)

ganize the necessary information for the student. It would serve just as Bulletin No. 5, the instructor's manual, is serving. *If the CAA wishes, the AOPA would be glad to prepare a manual under CAA supervision.*

Gas Tax Refund Problem

The AOPA committee on gas tax comes up with this one. Why couldn't the gas sales slip have printed upon it a statement conveying the "power of attorney" from the purchaser to the vendor? *By signing the sales slip the purchaser could convey to the vendor the authority to collect the gas tax refund.* The vendor could refund the sales tax immediately to the purchaser and, at the end of the month, collect the refund on such sales under the "power of attorney" conveyed to him. Each could save the state tax departments a tremendous amount of bookkeeping and overhead expense. In states where a Preliminary Questionnaire is necessary, the system need only be applied to those who have established their right to the refund. This plan might be attacked by some state authorities, but certainly it would be feasible and practical—and, we are informed by our counsel, is entirely legal. It would be more work for the vendors, but a service much appreciated by the buyers. The system is used in Holland and Belgium and is very popular.

The Manufacturers' Conference

At the Washington Conference of Aviation Manufacturers the AOPA presented in brief this statement or viewpoint:

"Government must assist the manufacturer with a comprehensive research in the field of miscellaneous aircraft and engine design and manufacture. To reach volume in sales we must have the application of every safety device possible. Most of our accidents start with the stall and end up after a spin. We must have better take-off performance, for too little power accounts for a sizeable number of mishaps. Low landing speeds also are essential. *One reason more flying is not done is that the average pilot mistrusts his own ability in weather and terrain margins now necessary for even our best aircraft.*

The manufacturer has been hounded to produce a "cheap" airplane. This pressure should be relieved. While cost is an important consideration in progress, it is not the first consideration. We can deal with the economics of flying better than we can explain accidents to the public. The type of people needed most as owners and pilots are those who have responsibilities. They will not come along until we have achieved soundness in safety and utility. They are not *afraid* of chance, but they cannot *afford* chance. We have reason to think that the stimulation of the pilot training program will eventually bog down to the past level of flight inactivity *unless we get equipment which can be safely used by the "occasional" pilot.* Current aircraft are perfectly safe for the *active* pilot. Experienced pilots often shake their heads in amazement to think that anyone could get in trouble with the ships now flying. Yet inexperienced pilots often do run into enough trouble to retard the general acceptance of miscellaneous flying by an uninformed public.

To we in aviation, cruising speed and top speed seem all-important. But to the man on the outside, low landing speed, control at low speeds and ease of handling on the ground are *first* considerations. We must stop demanding aircraft which are built to cater to pilot vanity.

The AOPA requests the manufacturers to cooperate in a standardization of what is known as "standard equipment". Advertised prices of aircraft, for example, should include tail wheel, brakes, floor covering, bonding, running lights, altimeter, turn and bank indicator and compass. *Breaking down sales resistance on price through elimination of essential operating assets is a great temptation. This doubtless sells some aircraft, but the purchaser operating on such a narrow margin is not the purchaser who can afford to do the most flying."*

The AOPA requests the manufacturer to develop a performance data standard which means something and to issue a maintenance and inspection manual. The AOPA expresses a deep sense of gratitude to the manufacturers for the world leadership they have given American miscellaneous flying.

END

WHY YOU SHOULD OWN A LUSCOMBE

A NEW THRILL IN FLYING—This quiet metal marvel gives you a new sensation of power and speed with ease of control. Its lightning climb and cruising speed of 104 make you wonder how we can sell tomorrow's plane today for only $1895.

SAFETY AND LOW COST—ALL-METAL construction, employing preformed and predrilled parts, makes it possible for us to produce one of the safest ships available. Such construction enables the rapid and inexpensive replacement of parts by any mechanic.

EXTRA REFINEMENTS—Streamlined beauty reaches a new high in this popular favorite of sportsman pilots. A low nose gives unequalled visibility. The 15-gallon fuel tank is behind the cabin, allowing more room inside. Rich upholstery and beautifully finished interior are standard equipment. The hinged cowl makes the engine easily accessible.

VALUE PLUS—A metal ship will last indefinitely An ALL-METAL Luscombe represents a greater investment in materials than does any plane of equal power and price. Only through standardized mass production can we offer such an exceptional value. It's yours for only $633 down.

ALL METAL Luscombe SAFETY

LUSCOMBE 50 — $1895, 65 — $1975, SEAPLANE — $3170

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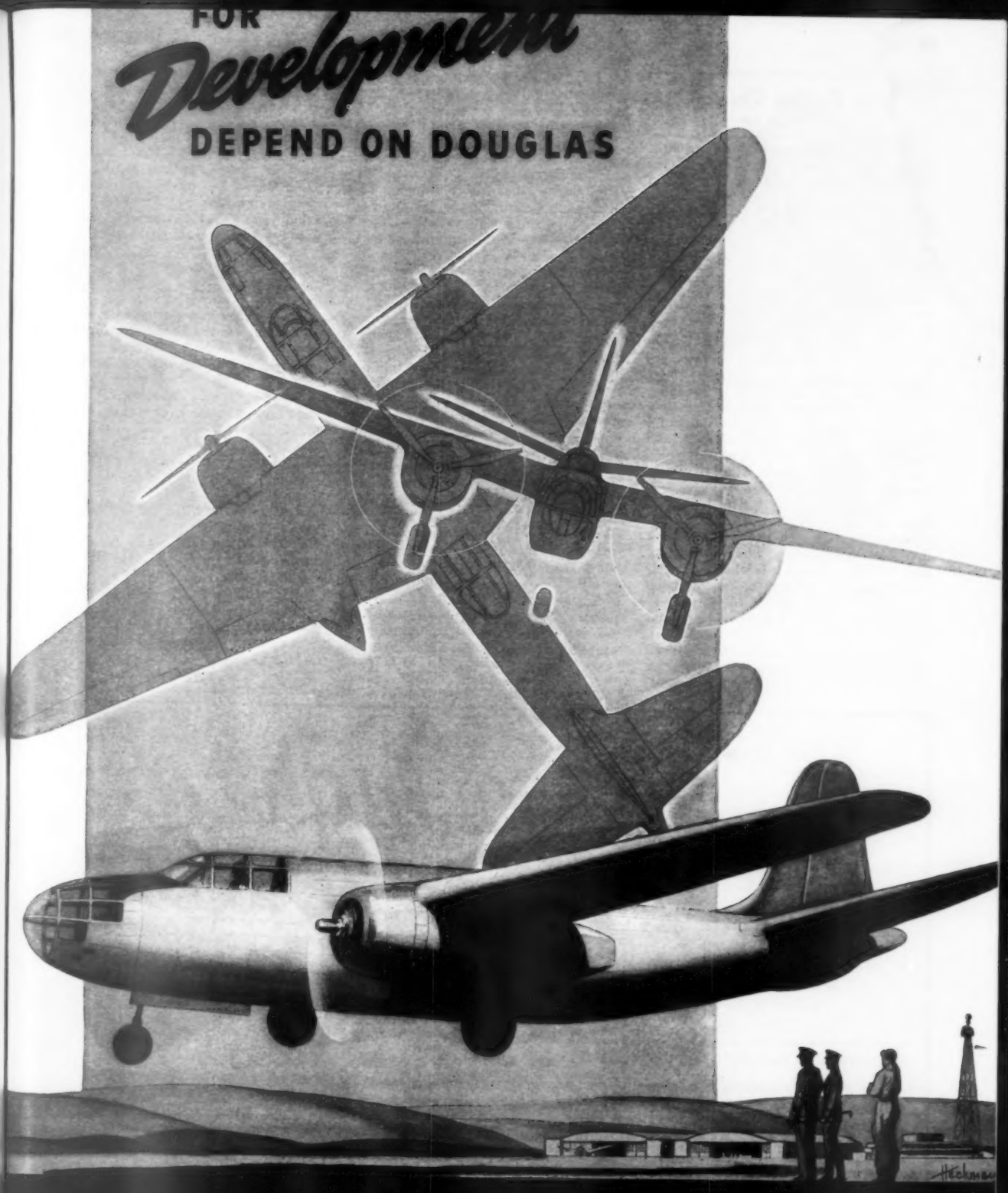
FOR *Development*
DEPEND ON DOUGLAS



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Douglas Aircraft Co., Inc., Santa Monica, Calif.

"FIRST AROUND THE WORLD"

Now the World Over

DOUGLAS

Stop Picking On . . .

(*Continued from page 31*)

mally rated at 100 to 150 h.p., and built planes around them that flew as fast as 270 m.p.h. Not an imposing speed these days, until stacked up against the results of some of our pursuit ship manufacturers in trying to get high speeds with 10 or 15 times the horsepower. After all, a pursuit ship is not a great deal different from a race ship and I doubt if there are more than one or two single-engined pursuit ships in this country today that will do much more than that at sea level.

One cannot build and develop a ship with so much speed, using so little engine, without learning a great deal about both planes and motors. Consequently, if our manufacturers have not learned anything from air racing, it is because they have not taken any part in it and have not availed themselves of the opportunity it has presented. Had they, for instance, as a part of their development or experimental work, built or helped to build, an entry for the races each year, they would have learned a great deal that they could apply to their commercial and military models. Not to be overlooked, too, would be the international publicity if they won and the possibility of regaining some of the expense involved.

Plane manufacturers would first of all have found that no great speeds can be obtained with big radial engines, no matter what kind of a washtub they wrapped around them. They would have called on the motor makers for more streamlined engines suitable for high speed work. Uncle Sam would not now be five or six years behind in high-speed engines suitable for pursuit work. They would have called for smaller, more compact units putting out greater power per cubic inch of piston displacement, inline engines—liquid cooled perhaps—anything but big radials five or six feet in diameter. This was well demonstrated in 1937 when S. J. Wittman, in a none-too-good-looking but very efficient ship with an obsolete inline V-type liquid-cooled engine, showed his tail feathers to the field for 17 of the 20 laps of the Thompson Trophy Race. Failure of an accessory forced him to slow down and give way to radial engined ships with two or three times the power. These in turn were overtaken by a ship with an even smaller inline type engine.

We American race pilots took a lot of razzing when, in 1936, a Frenchman came over and trimmed us so easily and completely. This should not have been surprising in view of the fact that we Americans had in our ships nothing more than pepped-up commercial engines. Even today, we must be content with taking a stock commercial engine, increase the speed and power output, reenforce it here and there and call it a racing engine. We try to run them just below the point where they will fly to pieces. We can put in heavier cylinder studs, stronger pistons, pins and other small parts, but when it comes to making stronger crankcases, crankshafts and other major parts to withstand the added loads imposed by the increased power developed, our limited funds make it impossible. Racing against us, the Frenchman, Marcel Detroyat, had a combination of plane, motor and propeller, each of which was developed especially for racing by large manufacturers who were financially able and willing to do this as a part of their development or experimental work. Who can deny that they benefited by these efforts as did Rolls-Royce of England (in their development of engines for the Schneider Cup racers) and Fiat of Italy by Mussolini's yen for copping the world speed record a few years ago?

Meanwhile, we were so thoroughly sold on the radial engine that, as late as the fall of 1937 when the writer went to the NACA at Langley Field to learn if anything new had been developed in the cowling and cooling of inline types of air-cooled engines, they frankly admitted that nothing had been done up to that time. They were just starting a series of tests along this line, but so far were able to determine only that a 145 h.p. engine of the inline type, with the conventional cowling had as much drag as a 450 h.p. radial with the NACA cowling and said that they believed that the gain of an inline type over the properly-cowled radial was negligible. We now learn that one of

(*Continued on page 66*)

a higher education

Look to Porterfield!

A higher education in the true sense of the word is provided through the expanded C. A. A. College Training program . . . A higher education into real profits is offered up-to-the-minute operators who choose Porterfield equipment for college training. It's wise to investigate the Porterfield liberal dealer plan before you purchase your equipment.

The 1940 Porterfield model "50" Collegiate Trainer has everything to help the operator and simplify the student instruction work . . . Excellent visibility—tandem seating—dual brakes—low landing speed—quick takeoff and climb—faster cruising. All these things mean more profits because you get more landings to the hour coupled with the ultimate in safety and economy of operation.

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The radio of a hundred uses!

Learadio Portable APR-1...

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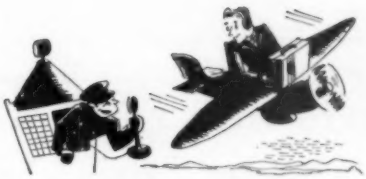
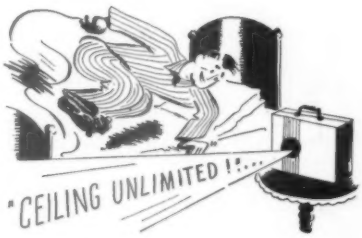
GET THE WEATHER! Take advantage of the Government's airway weather broadcasts and fly more safely. The APR-1 tells you when to keep going and when to turn back.



LAND AT TERMINAL AIRPORTS! Tune in on 278 KC and receive the control tower's extremely valuable landing instructions. In many terminal airports a radio receiver is obligatory for landing permission. The APR-1 is your answer!



GET THE WEATHER BEFORE YOU FLY! It takes about two seconds to remove the APR-1 from your ship. Then take it with you wherever you go and keep in constant touch with the weather. Use it in your home, office, hotel room—anywhere! Requires no ground, no outside power, no outside antenna. Just turn it on!

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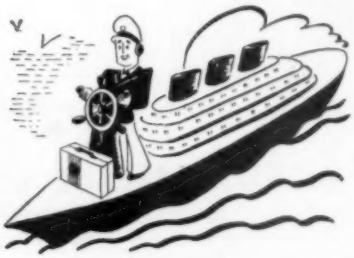

USE IT AS A DIRECTION FINDER! Featuring a built-in loop antenna, the APR-1 offers highly directional characteristics. Boat owners use it to get an accurate "fix" of their position even when out of sight of land!

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$39.50

COMPLETE WITH BATTERIES
$5.50 ADDITIONAL FOR LEARADIO HEADPHONES

LEAR DEVELOPMENTS, INC. *Roosevelt Field, Mineola, Long Island, N. Y. Cable Address: Learvelop. West Coast Branch, Wilbur J. Zepp, Mgr., Los Angeles Municipal Airport, Inglewood, California*

(*Continued from page 64*)

our latest pursuit ships, with an Allison inline engine, is 45 miles faster than the same ship with a radial of equal horsepower. Quite a gain, I would say.

Our motor manufacturers have done a fine job of developing good, reliable radials. The NACA has done wonders in reducing the drag of these big brutes by developing very efficient cowlings, but it seems that other countries have put forth an equal amount of effort on another type of engine, basically a more aerodynamically correct type, and have gotten better results in ultimate performance of their airplanes, at least as far as speed is concerned. After all, speed is the chief virtue of the airplane. In airplane, automobile and speedboat racing, European creations have been taking a large part of our American prize money and trophies lately—too large, in fact. Is it not because in those countries the manufacturers of the corresponding commercial and military counterparts undertake the development of these creations instead of individuals as in this country? And, are not the results reflected in the performance of their commercial and military products?

It is significant that, so long as our Army and Navy participated in racing, we held a good share of the world records and were at least equal to, if not ahead of, other countries in motor development. Likewise, our pursuit ships were as fast or faster than any in the world. Since the Army and Navy quit their racing activities and the demand for extreme speeds was not there, our plane and motor manufacturers naturally turned their efforts to the slower and less exacting requirements of commercial enterprises. However, it is the struggle for extremes that brings the average to a higher level in any line of development.

Had our plane manufacturers gone in for air racing they would have learned too that, along with the inline type of engines, more suitable propellers would have to be developed. Propellers without a foot or two of round shank next to the hub, churning up the air right at the "entering edge", messing up the air flow over the fuselage and contributing little or nothing to the thrust. Then, too, it is likely that the windshields on some of our military ships would not look so much like steel bridges with plastics wrapped around them. Take a look at the new Heinkel pursuit which made such a remarkable speed record recently, and you will see a nice smooth curved shield similar to those used on some of our race ships for years. This is one point on our military ships that has always been an eyesore to most racing plane builders and only recently have more sensible and efficient windshields been in evidence—but they are still a long way from "clean." There are a number of other things about even our modern pursuit ships which stick out like sore thumbs in view of our experience, but it would be poor policy to express opinions freely. Logical and probable improvements are constantly suggesting themselves in our search for m.p.h., but many of them must be passed up for lack of the necessary funds to try them.

The disinterested and somewhat contemptuous attitude of the manufacturers towards air racing and its present and potential accomplishments is quite incomprehensible and discouraging to we racing plane builders and pilots. The races have suffered from lack of more entries recently. In addition, throwing this scare of the possibility of air racing being done away with entirely, certainly does not encourage the building of more race ships. It requires an investment of at least $8,000 to $10,000 to build a racing airplane in the smaller of the two classes now being raced. The unlimited class requires even more. This year all indications were that we would have only the National Air Races at Cleveland from which to realize a return on our investments. We had another race scheduled earlier in the year, but it was called off, ostensibly because of a war scare. Actually, it had all the earmarks of this same sinister opposition, working from the inside. It seems very short-sighted on the part of those responsible and I fail to see where anyone was benefited thereby. It seems selfish in that, in some cases, this opposition is in the form of personal dislike for certain individuals engaged in racing activities. There are others, now definitely opposed to racing, who were themselves at one time prominent in racing activities but who have apparently now grown old and sour.

The National Air Races, in spite of a very successful meet in 1938 with an ever-increasing gate, cut the total prize money down this year by $17,000. The race management wanted the 397 cu. in. class of race re-instated this year and had a sponsor for it, while the NAA wanted a 50 h.p. race. The net result was no race at all and the $17,000 reduction in our prize money. This was done in spite of the

(*Concluded on page 68*)

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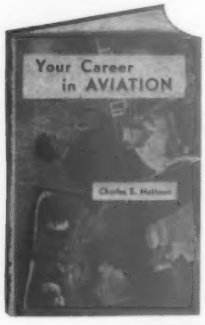

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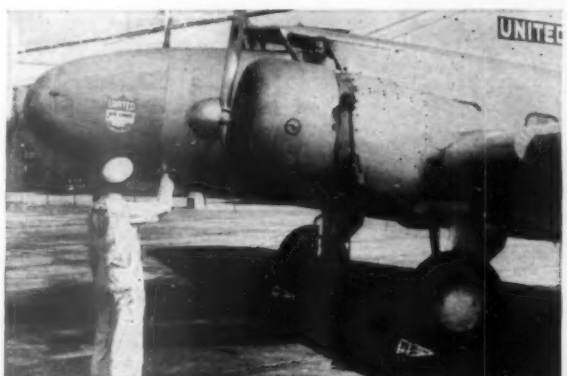

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UNITED AIR LINES

BOEING SCHOOL OF AERONAUTICS A DIVISION OF UNITED AIR LINES

Rental Operator

(*Continued from page* 15)

der that Speer and his cohorts have developed an uncanny ability to size up and are so careful about checking out a new pilot—or an old pilot in a new ship.

The greatest hazard is the show-off, according to Speer. A mechanical flyer, after all, can be pardoned on the assumption that he usually is at least conscientious, if not psychologically fit. But there is no excuse for the continued existence of smart alecks who clutter up the sky and, more often than not, such existence—both of pilot and of plane—comes to a violent conclusion.

There was the fellow who held a commercial license—certainly a gilt-edged customer, one would think. He had been flying alone for two hours without incident, when he landed to pick up a passenger. The take-off immediately thereafter was like none the pilot had made all afternoon. Evidently to impress his passenger with his flying prowess, he pulled up far too steeply, stalled and spun in. Speer lost his ship and both occupants lost their lives.

"I've had more trouble with pilots when they have passengers than when they're alone," Speer said. "The smart-aleck type just can't refrain from showing off, even when he ought to know better, as was the case with this commercial license holder.

"We have some fellows who fly at our field who are thoroughly capable and hold commercial or l.c. tickets, yet we won't let them take up a passenger. They are just the kind who, when they get an audience, lose all respect for our property, their own lives and the lives of their passengers."

In another such instance, a flyer with only a student permit and with but a few hours' solo experience, was checked out and approved by Speer's own pilot for rental of a small plane. He was given explicit instructions to land nowhere but on the Speer field, with which he was acquainted. Against these orders, he flew to the municipal airport nearby, picked up a friend—thereby breaking a CAA regulation prohibiting student flyers from taking passengers—and proceeded to act the clown. With the clever notion of scaring the wits out of fishermen peacefully dozing in their boats on a lake in San Diego's back country, they zoomed close to the surface and smashed into wires hanging only 50 feet above the spillway of the lake's dam.

It took several hours for deputy sheriffs and the coroner to get all the fragments together.

The universal trouble with such smart alecks, Speer points out, is their failure to appreciate the fact that even that miracle of the skies, the airplane, has limitations. Aviation has its parallel to the flaming youth whose one-armed driving of a high-powered roadster excited the admiration of the female sex in the Jazz Age. Speer has had his share of experience with this type.

Accustomed to piloting powerful military planes through acrobatics a flyer, on an afternoon off from official duties, rented a light, low-wing monoplane, took a girl friend with him and soon was engaged in breath-taking maneuvers. On one of these, at an extremely low altitude, the ship stalled in a vertical bank. The skill of the pilot enabled him to recover partially, but not enough to prevent a splattering landing, in which the landing gear was sliced off and the plane slid on its belly for 100 feet or more. The net result, in addition to the shredded airplane, was broken limbs for both aviator and passenger.

"Light private planes are intended primarily for smooth, on-the-level flight, not for wild test hops to see which will hold together longest, the pilot or the ship," Speer exclaims. "The radio and movies have done much to give many youngsters the wrong idea of aviation. It's gotten so one doesn't recognize the sound of an airplane motor over the radio unless it is zooming or in a power dive."

There is the incident in which a Speer ship was flown into an isolated section where the flyer, drawing on a vivid imagination, pretended a pylon was sticking up out of the tules and danced his little ship in tight circles around it. With every turn, the plane lost altitude and dismayed indeed was this dizzy flyer when a wing caught on the ground to end his one-man Thompson Trophy Race, demolishing the ship. Somehow, the pilot emerged unscratched.

Know-it-alls who are 'way ahead of their instructors, such as this student—who should have considered it a privilege merely to be able to fly horizontally—are the bane of the rental man. Speer was almost ready to throw the whole kibosh overboard when he came to work one morning to discover that one of his best ships had been stolen the night before by a pair of unlicensed madcaps on a spree.

Where was his watchman? He had helped engineer the theft!

Possessed of wild adventurous yearnings, he felt he had to express them with what can easily become man's most dangerous plaything—the airplane. With a friend, he took off from the unlighted field shortly after midnight in a miraculous performance. Their ability to keep the plane in the air at night—neither had ever piloted a ship after dark—was another miracle. But miracles have to end and theirs ceased when they struck a pole at a beach amusement area, only 20 feet from the ground, in the midst of a

(*Concluded on page* 70)

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Stop Picking On . . .

(*Continued from page* 66)

wishes of the Professional Race Pilots chapter of the NAA, of which all the race pilots and plane owners are members and who were all with the race management in this case. We have wondered lately just who is closest to the heart of the NAA, the race pilots, the race management or other commercial interests.

Unless we are able to change this antagonistic attitude of the industry towards air racing, enlist the participation of the Army, Navy or our manufacturers and get more support instead of discouragement, I am afraid air racing is doomed to die. It is an interesting and potentially constructive and useful endeavor, if only our commercial and military interests would recognize the opportunities it offers and spend a small part of their appropriations for development work in this way. Certainly, it is not deserving of the ill will and intolerant attitude of the industry which now prevails.

END

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(*Continued from page* 68)

thrilling exhibition of illegal low flying.

Just another example of how a rental operator has to learn about flyers the hard way.

The pay-as-you-fly men are sold on the necessity for more thorough instruction of America's budding aviators. "Good ground school training would give pilots the respect for airplanes they deserve," Speer observes.

"They should be taught why a plane flies, as well as how. A lot of them don't know what causes a plane to stall, for instance. Or the simplest principles of navigation, meteorology and aerodynamics. Why try to fly if you can't plot a course or if you don't understand why your ship won't react properly to certain situations?

"There's a lot more to flying than just opening the throttle and pulling the stick back. Not only should they be taught what the Civil Air Regulations are, but they should be impressed and re-impressed with the fact that these regulations are for their own protection. Laws are a means toward greater freedom; they shouldn't be considered a restriction of freedom. We need to be sure that gets across to every student and not let him graduate until certain that it is in his blood to instinctively observe all air regulations at all times—not just when he may get caught."

Consider the problem of the rental operator. He checks out a flyer in the plane he wants to rent by sending his own pilot along to observe whether the ship is handled correctly. He can't go farther than this in precaution. Then he lets the flyer take the plane alone, for so much an hour. Off he goes and what he will do or where he will fly is beyond the control of the rental man. If the aviator hasn't had drilled into his brain the dangers of flying through clouds, or coming down through overcast, or low stunting, or maneuvering over terrain where forced landings would be unsafe, or of landing in a small, out-of-the-way field which he first has not walked over to learn that what looked like bushes are trees and that dark spot is a hole big enough to bury his ship—

Or if he doesn't respect his engine and treat it like any other ordinary piece of machinery—

Well, if you don't know the answer, ask the "fly-yourself" operator. Learn about flyers from him.

END

Women Pilots

(*Continued from page* 23)

Air Corps pilots and personnel are prone to look down their noses at women pilots, as well they might, for as a whole we have not enjoyed the opportunities or advantages afforded even the ordinary male pilot. However, if worst comes to worst I believe they would find us not only humble but apt and willing pupils, ready to take over to the very best of our ability those tasks which would release them for the job for which they have been prepared.

There are many outstanding women pilots with sufficient experience to step into both instruction and airline jobs with no preliminary training. As a few examples there are Ruth Nichols, Phoebe Omlie and Mae Haizlip. Marty Bowman and Gladys O'Donnell have soloed many a student. Other outstanding women pilots are Jacqueline Cochran, Blanche Noyes, Joan Shankle, Helen Richey and Helen Rough, Betty Gillies, Arlene Davis, Edna Gardner, Harriett Issacson (who runs her own flying school in San Francisco), Florence Lowe Barnes, who organized the Woman's Air Reserve, Laura Ingalls and many, many more who could step into co-piloting jobs today were it necessary.

Over 60 women with commercial ratings have logged over 1,000 hours and more than 20 have logged over 2,000 hours. A number of these have at one time or other held instructor's ratings and some hold instrument ratings.

When we talk in terms of training 30,000 to 50,000 pilots a mere 600 women pilots seems inconsequential. Yet these 600 are trained and the 30,000 are not. The 30,000 are potentials where we are actualities.

The rank and file of us do not realize that the training of a military pilot in these days takes from 1½ to 2 years. The European crisis has thrown a crisis into our own laps—one for which we started preparations too late. So it may be that the women of the United States will be called into active duty or will be gratefully accepted as volunteers as they were in Spain, China, Russia and are now in Germany.

END

Swedish Fighters

SCANDINAVIAN air power is to be augmented by a batch of British warplanes which rank as the fastest biplanes ever in service in the Royal Air Force. Following the success achieved by Gloster *Gladiator* multi-gun single-seat fighters in the Swedish Air Force—which they joined in September, 1937, and subsequently—Norway has announced purchase of a second batch of these handy aircraft for fighter duties.

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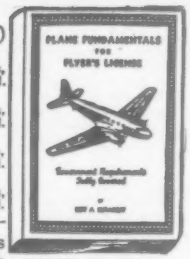

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The sidewalks in Chicago's "Loop" were crowded with men, women and children . . . all looking up at the darkening, November sky! Through the gray clouds appeared a weird, incredible light . . . like a huge ship glowing with some eldrich illumination! Nearer and nearer it came . . . until . . .! Then—all hell broke loose! A panic-stricken metropolis was being invaded by an army of metal men . . . robbing . . . ravaging . . . killing! Who were they? Where did they come from? What did all this mean? Could it be possible that science was remaking the world? Relax in sheer breathlessness . . . read DEATH OVER CHICAGO . . . one of the many complete, entertaining stories in the

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Airliner of 1950

(*Continued from page 25*)

the wing, to eliminate wingtip stall. This type of slot, pioneered by Lockheed, is being taken up by other manufacturers. The slots provide a flow of air over the ailerons in a stall, giving lateral control and eliminating the tendency to fall off on one wing or another. On the other hand, there is no loss of efficiency in normal flight.

I am willing to hazard the prediction that the same airliner which takes you over the mountain fastnesses of Arizona in 1950 will be taking you over the ocean as well. Yes, a landplane. I firmly believe that in 10 years the flying boat, cumbersome and inefficient, will be a thing of the past. Flying boats have increased in size faster than landplanes for two reasons. The first is because operators have demanded multi-passenger and large cargo transportation for over-sea travel. These demands have been far in excess of the demands made by land operators. The second is that the flying boat has had longer available "runways"—greater take-off areaways without hazards.

But experience has proved sadly again and again that if a flying boat lands on a rough sea it will sink. Nothing can be built to land at speeds of from 85 to 90 m.p.h. on storm-whipped water and survive the beating. So one might as well set down a landplane as a flying boat. Too, a hermetically sealed landplane would be just as safe as a flying boat if forced down in a calm sea.

I base my prediction on the fact that the problem of safe over-water transportation does not rest in the seaworthiness of the plane. It rests in whether or not the motors will function throughout the flight. With in-line, liquid-cooled motors set in the wing so as to be accessible to flight mechanics, your 1950 landplane will be more efficient, carrying greater payloads and flying faster, than your flying boat.

There is always talk of using the fuselage as an airfoil, thus increasing lift. With airplanes of the present size, the belief that such a fuselage would increase lift is a delusion. Any attempt to design such a ship would be a waste of time because the airfoil of the fuselage and the wing would be so different in pattern that they would not complement each other. The result would be turbulence rather than mutual help. Which means that the present round fuselage design will continue, probably through 1950.

On the other hand, when the flying wing becomes a reality, there will be no disparity in airfoils, for your wing is your fuselage. Only then will the so-called "airfoil fuselage" become practical and efficient.

The instruments on the 1950 airliner will be practically unchanged. There undoubtedly will be more, due to the fact that engineers are constantly developing new ways to measure this and that—and also due to the fact that more accessories which contribute to the comfort and safety of passengers are being invented.

The airliner of 1950 will be of mid-wing design because it is best aerodynamically and because it moves in steady progression toward the flying wing. Such a wing has less drag, as proved by countless wind tunnel tests. It probably will lower passenger visibility, but in 1950 this probably won't mean a great deal. Frankly, the passengers on that 1950 airliner won't care whether they see out or not, because all there'll be is blue sky and the earth, far below, in a haze. These passengers will be reading in their seats or in a lounge. Or playing bridge. Or conversing. But they won't be bothering to look out.

Passenger comfort? Well, there'll be

(*Concluded on page 74*)

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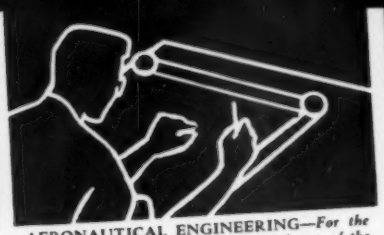

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(*Continued from page 72*)

more room to move around. There'll be separate conveniences for men and women. There'll probably be drawing rooms for those who can afford them. Berths will be larger, both in length and width and have better springs. There'll be a larger crew to care for passenger needs. Two bugaboos of air travel—the constant lessening and increasing of pressures which hurt sensitive ears—and the bumpiness attendant to low flying—will be eliminated. Cabins will be quieter, the engine scarcely heard. Passenger and pilot fatigue will be lowered because of steady pressure. Passengers will alight much more refreshed than they are today when that 1950 airliner reaches Burbank.

What of flying aids? Blind landings will be child's play, due to radio, judging from present progress. Static will be eliminated. Head resistance, due to planetary winds, will be increased one-way as flight levels are increased, but that's a problem in operations, not for discussion here.

Airports will be increased in size only slightly as an added safety factor. It is certainly not going out of bounds to predict that the airport which today offers a reasonable margin of safety will be adequate for the plane of 1950. No designs which we contemplate will demand greater landing or take-off area. Talk of it being necessary to increase the size of all airports to accommodate forthcoming product is uncalled for.

I have placed speed at better than 300 m.p.h. in 1950. In that, I feel that I'm being conservative. It is probable that in 10 years we will see cruising speeds of 400 m.p.h., and your 1950 airliner may come in from Kingman to Burbank in nearer 35 than 45 minutes. There will be no increase in cruising ranges in 1950, unless, perhaps, a non-stop deluxe flight say from Burbank to Newark should be inaugurated. If this occurred, the problem would merely be one of increased gasoline capacity with a resultant cutting down of pay load.

I have been conservative, too, in the matter of size. It is quite possible that in this 1950 airliner in which we've been riding there'll be 149 other passengers, instead of 100. The gross weight may be 100 tons instead of 75. At first glance, the jump from the 14 tons of the standard airliner to 100 tons is quite a jump. But it is not much greater in proportion and length of time than the advance from the three-passenger sightseeing biplane of the late twenties to the present models in service and the DC-4, soon to go in.

It has been the experience of aeronautical engineers that with the increase of size there has been no loss of efficiency. In fact, it is safe to say that there is a slight increase in efficiency as planes grow larger. This was not true, of course, in the days of wood, wire and linen. Metal has brought a different viewpoint.

Whether or not your airplane of 1950 carries 100 or 150 passengers depends more on the operator than it does on the designer. Let the operator come to us and place his order. Our vista is not limited by any known limitations. Your airliner of the future depends on how much you fly, how far you fly and the conveniences, speed and comfort which you demand. You will ask what you want. And we of the drafting boards will go to work to give it to you.

END

This Month's Model

(*Continued from page 56*)

Patience is necessary in covering your model and you will be well repaid for your efforts when finished. Water is used in shrinking the bamboo paper to the correct tautness.

Cover the elevator and rudder separately from body and pin to flat surface when drying so as to prevent any warping. Two to three coats of clear dope are next added with a light sanding between each coat for a better finish. Stiff cardboard is used over the center section of the wing to cover battery rack and coil. This is held in place with four small wood screws.

Final Steps

After all parts have been installed in the model, check everything very carefully again to make sure all wire connections are tight and that the motor is held securely in the mount. Test the model for its proper gliding angle and shift batteries as well as wing and rudder tap for the correct adjustment. Glide the model over some tall weeds for the first few trial flights, until the proper adjustment is had

END

Holland Branch

THE LOCKHEED Aircraft Corporation has established a European parts and service base at Amsterdam, Holland, which so far has cost the American manufacturer $100,000. The base is considered a subsidiary company of the parent Lockheed organization and is known as the Lockheed Internationale Verkoop Maatschappy N. V. (Lockheed International Sales Company).

Wind Tunnels

FIVE new wind tunnels are under construction in Great Britain for research into problems of flight. Four are required by experts who work at the National Physical Laboratory, Teddington. The fifth is being built at the Royal Aircraft Establishment, Farnborough, and is planned for investigation of conditions arising from speeds of up to 600 m.p.h.

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Amelia Earhart

(*Continued from page* 13)

She used to say, laughing gaily:

"I haven't the courage to tell people my plans in advance. A pilot shouldn't worry and if I listened to every prediction I'd probably never leave the ground."

It is not generally known that forecasters predicted accidents on two of Amelia Earhart's successful ocean flights —or that several astrologers begged her not to fly on March 20th in 1937, the day her plane was smashed on a take-off from Honolulu.

Despite his willingness and feverish anxiety to leave nothing to chance, George Putnam found little or nothing tangible in the first rush of letters from eager writers. He was ready to be shown, but there was heartbreaking confusion and disparity in every batch of mail. Late in July, however, occurred the first of several remarkable events. That morning Mr. Putnam received the following telegram from Hamilton, Ontario:

AMELIA EARHART ALIVE ON CORAL SHOAL ON ONE OF GILBERT ISLANDS LATITUDE 2 ABOVE EQUATOR 174 LONGITUDE. THIS MESSAGED RECEIVED BY MR. L—— NEW YORK MEDIUM.

Mr. Putnam made a note of the position, intending to check it later on his maps, and filed the telegram away. An hour or so later, when the morning mail was delivered, there came a brief but pleasant note from Captain T—— M—— of Cape Breton Island, Nova Scotia. Mr. Putnam eventually came to it, in the monotonous process of routine, and began reading:

". . . I am the retired captain of a copra boat that used to trade in the South Seas. I just happened to remember an uncharted island that we frequently visited for turtle eggs. The Gilbertese natives know where it is, too. The island is at——"

George Putnam was suddenly out of his office chair, yelling for his son.

"Dave! Oh, Dave!"

David Putnam came, running.

"Trouble, Dad?"

"No. Listen, Dave, get me the telegram that came this morning from Ontario, Canada. The one about the island near the Gilberts."

David fetched it, and he and his father nervously compared the latitude and longitude with that give in Captain M——'s letter. *They were exactly the same!* The retired skipper's letter, however, gave a more detailed location—174 degrees 10 minutes east longitude, 2 degrees 36 minutes north latitude. A hasty examination of a huge map located the spot, roughly about 85 miles from Tarawa island.

Urgent telegrams were rushed to the Ontario medium and to Captain M——, asking further details. Suitcases were packed for a swift trip to New York. The telephone wires throbbed with calls

(*Continued on page* 78)

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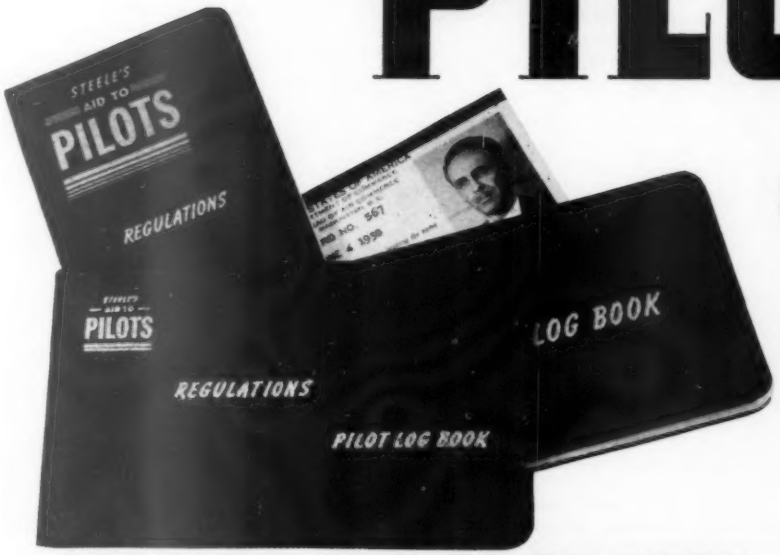

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(*Continued from page 76*)

to navigation authorities, Government officials, explorers, seasoned travelers—anyone who might have come upon that tiny dot of land in their wanderings.

Two days later, in New York, George Putnam knew in his heart that he must have that island searched. And finally, through the cooperation of Sumner Welles, Under-Secretary of State, the transatlantic cables to London pulsed with Mr. Putnam's plea. The British authorities agreed to communicate with their consul in the distant outpost and a search was arranged—at Mr. Putnam's expense.

A vessel put out from Makin Island, skimmed through uncharted lanes and soon came to 174 east longitude, 2 degrees north latitude.

But the island had vanished. The seaching crew checked and re-checked their bearings. They poured over maps, took soundings, and cruised around the spot for two days. But there was no land within 20 miles, there wasn't one single clew to indicate what might have happened to that uncharted speck of earth. And the island has not been found to this day.

Captain M—— and former members of his crew, all reliable seamen, swore they had been to the island half a dozen times. Even the log of the copra ship confirmed their tale. The only possible explanation to the mystery—if it is that—is that the island was swallowed by some submarine upheaval of volcanic origin. Was Amelia Earhart driven to that isolated isle for refuge—and sucked under when it plunged beneath the sea? Who knows? The episode had only one weird sequel—baffled admission from the Ontario medium that he was never again able to contact Amelia Earhart on the island where he had last heard her voice. And, just as a statistical reference, that expedition cost George Putnam $1,000.

While Putnam was in New York late that summer, stopping at the Barclay Hotel, he was approached by numerous persons who offered to sell him information concerning his missing wife's whereabouts. One man, Wilbur Rothar, a Bronx janitor, actually claimed he had found Miss Earhart on a South Seas island, and attempted to extort $2,000 from Putnam. He was trapped by Department of Justice agents, found insane by a board of alienists and sent to an asylum for life.

(*To be concluded in next issue*)

Sea- and Sailplanes

SIXTY-FIVE of the highest ranking students who recently completed the Civil Aeronautics Authority's civilian pilot training course took special courses in the operation of seaplanes and sailplanes as a continuation of their work last spring in the colleges. The seaplane instruction was given by E. W. Wiggins Airways, Inc., Boston, Mass., and Kurtzer Flying Service, Seattle, Wash., while soaring was taught by the Soaring Society of America in Elmira, N. Y., and the Frankfort Sailplane Mfg. Co., Frankfort, Mich.

Soaring Record

A BRITISH pilot—G. H. Stephenson of the London and Surry Gliding Club—is the first person to sailplane across the English Channel. He made the crossing in the course of a three-hour flight which began at Dunstable and ended nine miles east of Boulogne, a total distance of 125 miles. The sailplane soared to a height of 6,000 feet and made the sea crossing in about fifteen minutes.

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I Learned About . . .

(*Continued from page* 41)

team in after the ship. It took three days to tear it down, mount it, get it into the wagon and haul it to the nearest highway. And the pay-off is that there was no excuse for the forced landing. I could have saved myself a lot of grief if I'd just been as smart as I should have been after 13 years of flying, including service with the Naval Air Service in France and Italy, barnstorming, stunting and motion picture work. What happened—the events leading up to that heart-skipping moment when the motor blew apart—was this:

I had decided that I'd buy the ship second-hand if it was what I thought it was. I had made a deal under which I was to fly it to San Francisco, where I had to go on business, and return. If I liked it, I was to buy. On this day, I was held in Hollywood on some important work. It was 2:30 before I saw my way clear to get away. And, in those days, when you decided to get off at three for San Francisco, you had to pour on the coal. There was no lighted airway, no lighted field and if you got caught up there, you stayed—until you had to land somewhere. Not only that. The weather was bad.

I called the airport at Venice. "Get her on the line," I said. "Warm her up and I'll be down in half an hour."

I hurried to the field. The ship was warmed, resting against chocks. I pulled on my flying suit, helmet and goggles, got in. "How is she?" I asked the mechanic who was going to give me a twist.

"Perfect," he replied. He turned her over and I revved her up. She didn't sound so good to me. She was rough. Nothing you could put your finger on—just rough I pulled back the throttle and called the mechanic to me.

"I don't like her," I said. "She shakes."

"She's been doing that ever since I've had anything to do with her," the fellow said. "She hasn't come apart yet."

I looked at the bad weather. I looked at my watch. They both said, "Go." There was a crowd around. Somebody started cracking about me getting to be an old man. Somebody else wanted to know if I was getting a yellow streak. I gunned the motor again. I was sure by this time that the motor was sour.

"I ought to get out and inspect the thing," I told myself. "I'm being a sucker."

The heckling began again. I was a this and a that and a so-and-so and how did I ever get a reputation as a stunt pilot? So I told the mechanic to pull the chocks and I was off to face one of the tightest spots I was ever to face. I've cracked up plenty of ships for motion pictures—but those were planned. This was just something I let sneak up on me because of my own foolishness. And when I walked away from that ship only

(*Concluded on page* 82)

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(*Continued from page 80*)

a few minutes later I'd learned a lesson that I'd never forget.

The first moral is that even today, when ships have improved, when mechanics know their business far better than they did then, never put yourself in a position which forces you to take the word of the other fellow about the condition of a plane. Don't rush it. No matter how carefully you've checked your ship on putting it away—no matter how sure you are that no one has tinkered with it—spend five or ten minutes going over it before you make a flight. Test and check everything on the ship, not because there's a regulation which calls for it, but because you're smart.

Second, don't beef at ground training. The more you know about airplanes the better off you are. I know that today airplanes are being made fast and people are learning to fly fast but, even so, under no circumstances should any pilot take a ship off the ground until he knows enough about its construction and its motor to know that it is in good condition from propeller hub to flippers.

Third, skip the other fellow's opinion. More pilots have come to a quick end than you'd imagine because pride forced them to take off against their better judgment. It may be a faulty plane—it may be bad weather—it may be a sour motor that tells you to stay on the ground. Maybe the guy on the sidelines who is heckling you wants you to take off. But, after all, it's your life and not his, he's kidding about. Anybody who lets pride force them into a dare, or who can't take a rib, is a sap.

After 1927 I had other experiences which proved the rule I'd made for myself. I was going to put on a stunt flight for a picture in a JN-4D one day. I went over the ship carefully—so carefully that I found that a bolt in the control horn behind the cockpit had worked loose and was just about to fall out. I would have lost the bolt, lost control of the tail and probably would have lost my life. Five minutes saved me that time.

There are two classes of pilots who should check their ships The first is the beginner who has a lot to learn, as well as a need for a check. The second is the experienced pilot who has reached the point where he has come to the conclusion that he flies by instinct and that he can "feel" if there is anything wrong.

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Retractable Wing

(*Continued from page 53*)

much speed with a 90 h.p. engine in an airplane capable of climbing a thousand feet a minute just doesn't make sense. Yet, the figures can't be denied.

The external fins on the stub wings provide all necessary strength for those members and a specially designed tubular steel spar construction in the main wing passed static load tests by the time-tried method of sand-bagging the entire wing structure.

The main construction throughout is of chrome-molybdenum steel. The truss arrangements are of the builder's own designs and have proved as strong as the more conventional trussing on other types of aircraft. For the benefit of the mathematical skeptics who will howl that the center of gravity will vary with the changing wing area, let me point out here that one of the two patents issued on the *Ellingston Special* is one that covers the need of shifting the wing forward and backward along the line of thrust to compensate for any changes in the gravity centers. In practical operation, though, Hansen found no necessity for utilizing this additional feature and the wing stubs were never shifted.

Stabilizer adjustments of conventional design are used to good advantages in landing and taking off. Landing speed with the wing extended is less than 40 m.p.h. With the wing partially retracted the landing speed is 65 m.p.h. These speeds at a field elevation of 3,600 ft.

With the wheels in landing position, the wings cannot be fully retracted, as part of the internal bracing for strength is tied in with the retracted wheels.

With war again running rampant through the western world, the cry of the military airman—now more than ever—is for more and more speed. Yet, designers cannot cut the wing area down for speed much more—and they cannot sacrifice bomb and gas load. Here, then, may be the answer to the military pilot's demand.

Hansen's and Ellingston's wing design is especially adaptable to the long-range, hard hitting bombing plane. This wing gives the necessary surface to lift an enormous load of bombs into the air, then allows the pilot to lessen the drag of excessive wing area in the interests of speed. The increased efficiency of a bombing group with these advantages, seems obvious.

The new wing is a logical successor to the wing flaps used in modern ships. It also may replace the catapult and pick-a-back systems of launching heavily loaded airplanes into the air. A well-known modern transport recently was turned down after extensive tests had proven it to be too "hot" for mountain flying. They had to cut the pay load from six passengers (rated capacity) to three passengers in actual mile-high operation. In spite of the reduced load, take-off runs still were too long and the ship landed at 90 m.p.h. Consequently, the ships were turned down because nothing could be done about the lessened pay load and excessive landing speed. Both the airline and the manufacturer lost on the deal.

Using a retractable wing, the cruising speed of the transport would have been retained while the landing speed would be lowered to less than 50 m.p.h. The full complement of six passengers also would have been carried.

At this writing, the blueprints for a bi-motored transport are being finished by the two designers and construction is scheduled to begin this winter. The new ship will have greater wing area variation than the original and also will be equipped with speed rings and controllable-pitch propellers. Plans for the new ship are being watched with interest by airline and military pilots. Many of these have made trips to Great Falls in the past year for personal inspection of the first model—now a hardened veteran with many hours' flying.

END

Wing-Flapping Research

AN organization has been founded in Florence, Italy, under the General Direction of Construction of the Italian Air Ministry, with a view to developing systematic activity in experimental research work concerning flapping wings.

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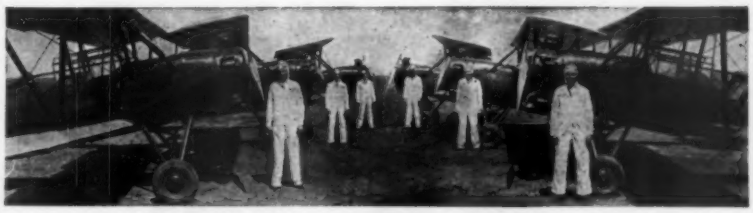

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Flying "High"

(*Continued from page* 18)

It says: "The aviation course at Haaren High School is organized on the industrial arts basis. There is no flight training, nor is the aim to produce qualified airplane or airplane engine mechanics.

"The course of study includes four years of English, three years of mathematics, two and one half years of science, two years of history and a year of civics and economics, in addition to the aviation work. The work in aviation consists of two years each of aviation shop, aviation theory and mechanical drawing. An additional year of shop and theory may be elected by advanced students. Five periods of 45 minutes are devoted each week to each of the aviation subjects.

"The shop work aims to give the student a knowledge of wood work, metal work and engine work in the first two years, and airplane rigging and electric work in the last year of the aviation course. The work in theory includes vocational information about the aviation industry, a study of the airplane, its parts, uses and construction, airplane materials, theory of flight, elementary and advanced gas engine theory and elementary rigging."

That course, in addition to training the boys for aviation, is sufficient to qualify them for a four year high school diploma. Not all of the students who graduate—and the school turns out about 600 a year—go directly into aviation, but it is estimated by one teacher that about 10 per cent of the graduates, among those who have kept in touch with him, end up in the profession. A large number of boys become so interested they go to college or technical school for further training. Some boys are interested in drafting, others engineering, still others the mechanical branch of the trade. A few become pilots. The school makes no attempt to place any of its students and has kept no record of their work after graduation.

Haaren High School, however, has since its conception in 1916 been a cooperative high school. In other words certain students are permitted to alternate a week of work with a week of schooling and this plan which enables a boy to earn while he learns has acted very advantageously for a number of aviation students. During their last three terms the 50 top boys are given an opportunity to work in the hangar at the Naval Air Station at Floyd Bennett Field. To justify this privilege they must maintain a scholastic average of 75 per cent while cooperating and any slip below that mark means that they must return to day school. The outstanding advantage of that system is that it enables the boys selected to get, through their contacts at the field, direct leads on full time jobs they may be able to fill after graduation.

Speaking to a school assembly several years ago Mr. Burnham said: "It is well known that it takes eight men on the ground to keep one man in the air. Let it be our ambition that Haaren High School will supply its share of those eight men."

END

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Canadian Line

COMPLETION of the last unit of a $500,000 order for Trans-Canada Air Lines has been announced by the Lockheed Aircraft Corporation after Canadian pilots flew the new plane to Vancouver, B. C., headquarters of the line. Delivery of the plane, a Lockheed "14" brought to 15 the total of this type now in service over the Dominion-spanning airline. Canadian Transport Minister Howe reported recently the operating results of TCA "have been excellent". In April, which was the first month of passenger-carrying operation, the passenger business on the Trans-Canada system amounted to nearly $50,000. In May the volume rose to approximately $60,000, and in June it was up to the $75,000 mark. In addition, Howe said, the company is doing about $130,000 worth of mail business each month.

Theory of Gliding

(*Continued from page* 50)

ing ship. Sections 10 and 11 show some of the details.

Care must be taken in designing the tow-line release mechanism that will release itself if the glider gets ahead of the tow-line in order to prevent an accident. A sketch in Section 12 illustrate such a device with a swiveling arrangement.

For estimating purposes the weight of the wing is from .8 to 1.4 pounds per square foot, the weight of the fuselage from 3.8 to 6 pounds per running foot, the total weight from 400 to 700 pounds and the wing loading from 1.8 to 4 pounds per square foot.

Section 13 illustrates a primary glider and soaring glider with a high aspect ratio wing.

The commercial use of the glider to transport material could be adapted to towing them to places that are not accessible to motored airplanes. Specially designed gliders, such as one shown in Section 14, may be used to transport heavy loads. And again two or more gliders could divide the load. Already five gliders have been towed over a distance of 1,000 miles without a mishap. The relative position of the glider and the tow-ship depend on their respective gliding angle as sketched in Section 14.

The very flat gliding angle of the soarers and the added ground effect makes them float before landing and it takes an exceptionally good pilot to put them down on a predetermined spot. Therefore devices known as spoilers are mounted in the forward section of the wing (Section 15) that will increase the sinking speed by their high value of resistance.

Most of the soaring gliders utilize the deflected air currents or the rising thermals called static soaring. However a great deal of research is conducted on the dynamic soaring that utilizes the pulsating air current.

END

Tough Luck, Inc.

(*Continued from page* 29)

With his gas gauge registering zero he landed on "Newark mountain", cracking one of the three main spars and doing other damage which represented a repair bill larger than he could afford. As a result the craft rested in a hangar at Newark until 1938 when Ed Connerton bought it for conversion as a two-seat military job.

By late August, 1938, the plane was ready for service and the thought of winning the Thompson with a Springfield-built fighter was too tempting to be resisted. Leigh Wade was given the assignment and flew the craft to Cleveland. At the last moment, racing jets were installed to keep the motor cool, although the gas consumption was later found to have been too rapid.

In the Thompson, Wade flew a steady, almost automatic race in fourth place most of the way. The racing jets in the twin-row engine burned all but a fraction of one of the 180 gallons of gas during the 300 miles, despite the fact that Wade flew with his throttle far from open. Knowledge that the fighter had flown faster than 360 with ordinary jets was little consolation in the race.

Brought back to East Hartford for more testing, Earl Ortman—who had finished second in the '38 Thompson—was chosen to do the piloting. One afternoon the plane was put through a series of dives, after which Ortman came out laughing: he had seen the needle pass the 500 mark. More turns and spins and dashes, and finally a last spin.

Something happened. Somewhere a flutter developed, and the fighter came down in pieces. Ortman 'chuted to earth, a member of the Caterpillar Club. Miller soon figured a cure for the flutter, but there was no money for a corrected model. At Cleveland last Labor Day, Ortman testified that the plane was the fastest and the best he had ever flown.

The Springfield outfit's latest production is a twin-motored, tricycle-geared feeder-type plane, built for the Aerovel Corporation and called the *Moonship*. Its power plants are Menasco 125's and the propellers are pusher. Radical in design, the craft has been flown but little, and

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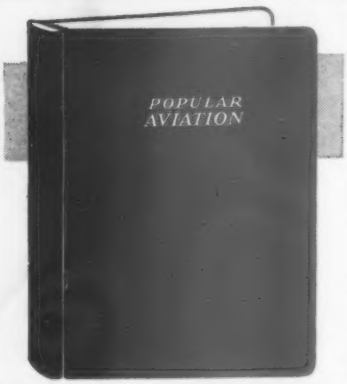

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last word is that Ranger 175's will be installed to give the extra zip desired.

Since completion of the *Moonship* this summer, the boys have gone back into hibernation. Many have received offers from other companies, a few have gone. Pete Miller has received offers too, but wants to keep the organization intact.

That's the story of plane building in Springfield and, more particularly, the story of the Granvilles and their associates. It's a yarn in which hunger could be written in every other paragraph. But it's the story of men who build speed planes the country over.

Hungry? Yes.

Discouraged? Yes.

Ready to quit? Hell no!

END

Two-Fisted

(*Continued from page* 38)

ing 1935 that Adams got results on his ballyhoo for two Los Angeles-Salt Lake mail schedules. Eventually he tossed in a third round trip free and gave three to San Diego, although the Post Office Department only paid for one.

In 1936, he arranged the conversion of the noisy 247's to the "D" type, installing more powerful engines and soundproofing for passenger comfort. In spite of this, he showed a profit of $58,300—and passenger revenue jumped to $353,000. Late in the year he ordered two DST's from Douglas. They were purchased with a far-reaching thought in his mind—that sooner or later he'd get permission for interchange of equipment and that his ships, with the Indian head on the side, would ride right through to the east, with U.A.L. sending its equipment down to Los Angeles. It's ironic that as he faces the merger the CAA has just given approval.

In the face of installing new equipment and huge losses due to an epidemic of crack-ups on all lines, Adams dropped only $34,000, and held passenger revenues up to $325,000 in 1937. In 1938, passenger revenue leaped again to $390,672 and loss was only $12,000, mainly caused by increasing operating costs generally and the low air mail revenue in relation to the amount of service given by the company.

Adams has been busy ever since he got the bug of running his line into Canada. The company has extended operations to Glacier National Park, has made route surveys to Lethbridge, Calgary, and Edmonton, Canada, and has filed for permission to operate with CAA. An examiner's report is expected momentarily.

"Estimated revenues for 1939 are $465,000 and we will end the year comfortably in the black," Adams declares. And, while low air mail rates cost WAE a loss of $12,000, U.A.L. was piling up a deficit of $990,000 for the same period.

On a map, Adams points out how logical it would be for WAE to fly to Alaska. He knows every foot of the line which is planned. And CAA is negotiating right now with Canada for a line north from Great Falls. Adams looks very sad as he eyes the map and contemplates that plum falling into somebody else's hat. It's tough.

There, ladies and gentlemen, is the story of what is now a model airline. But what of Adams himself? The man who made a model out of a shambles was born in Grand Junction, Colorado, December 29, 1905. He inherited his brains and his ability to cut corners, for his father was a banker, precocious enough to have himself elected mayor of the town at 21.

Young Alvin went to Denver with his family in 1912, attended Denver public schools, graduated from East Denver High School and then from Phillips Exeter Academy, Exeter, New Hampshire, in 1923. Four years later he was out of Yale, having worked his way through by his ability as a musician. He toured Europe for two summers, played before the King and Queen of Spain with the band. On the side, he boxed with the Yale team and cleaned up on every man he met as he fought from 124 to 147 pounds, growing all the time. He also had time to become a Beta Theta Pi.

His first job was with the *Wall Street Journal* and he was all set to be a financier when that thing happened in 1929. In fact, he was already vice-president of National Aviation, a holding company, when the boom went boom. He married Elizabeth Miller (whose father, Nathan Miller, was once governor of New York state) in 1929, too.

He kept his eyes on WAE until 1934 when he finally took it over as his baby—in need of a transfusion, several operations, a diet and new clothes. For five years he cared for it, watched it grow, devoted his life to it. It turned from an under-nourished ugly duckling into a prize-winner.

It's not hard to understand, right now, while Adams is pacing the floor of his office, why he's worrying. After all, no proud parent wants to lose his offspring. And, while he won't say so, Adams is going to spare no effort in keeping lusty WAE from moving into the big house up the street.

END

Watch That Belt!

CARE should be taken to see that safety belt ends are not under the door and outside the ship when the door is closed. One recent case of this reported to Aero Insurance Underwriters caused serious damage to fabric and wing root fairing. In fact it was necessary to renew the metal fairing as a result of the damage.

While on the subject of belts, it may be well to note the damage caused by mechanics when working on a ship and leaning over it with metal belt buckles as used on conventional shop coats. Eliminating this, would save a lot of scratches and dents on the fine present day finish of aircraft.

Seaplane Odyssey

(*Continued from page 43*)

the final fueling, and Kenneth P. Behr, manager of the airport, helped me in the rest, even to finding me a place to sleep at the airport. It wasn't really the way a big-time flight for a record is conducted. I felt that even when the Coast Guard had shown me the shoals and unlighted buoys which might be obstructions in a daybreak take-off. There was a distinctly amateur quality about the whole flight.

That was where the amateur angle ended. The fog and rain and occasional snaps of wind were rather professional and competent in their own way and it wasn't the sort of way to make a flight like this a joy ride. Not until I'd hit a stretch about 15 miles northeast of Greensboro, N. C., did the rain let up a little. Then all the way down to South Carolina the clouds began to tire and chased upstairs. Suddenly the sun came out, winked once, ducked back out again and stayed with me for awhile.

Fun? In a way, except that it was 1:30 p. m. when I first remembered about eating. And it was a little after that when it occurred to me that a radio was useful aside from getting weather and beam reports. I'd been hearing nothing but mechanical, if pleasant, voices giving me information all the way, but now I fiddled around until I got a good musical program.

Over Atlanta I found the tail wind had pushed me up to 110 m.p.h., so I throttled down to about 100 revs under normal cruising. I figured I might as well save fuel, from what I'd seen of bad weather—and the stout little engine could use the rest. For that matter, so could I. And I got it. Near Montgomery, Alabama, the weather was so completely guileless and smiling that I took out my shaving kit and began to do a much-needed job on the beard I'd taken with me from New York.

Just about this time I decided things were going too well, so I began to figure out ways and means of ending it. Somewhere over Mobile I knew I'd covered sufficient ground to break the record and, with the fuel I had left, I thought I might make Galveston safely. The sun was what southerners like to imagine a southern sun is, lying on the horizon in a bath of purple and gold and the landscape looked like the unreal postcards friends are always finding when they travel.

Well, it hit again. Near Biloxi, in the sunny southern state of Mississippi, the clouds started ganging up again and preparing to charge down. First there was a slight burst of rain, then another. It eased off momentarily, but I knew what was going on. It seemed like a sucker's game to try to outsmart the weather again, this time in complete darkness and I'd played long enough. Even then, reaching the New Orleans Airport at 6:29 p. m., the weather stayed foxy. There was a surface wind of 25 m.p.h. snapping and

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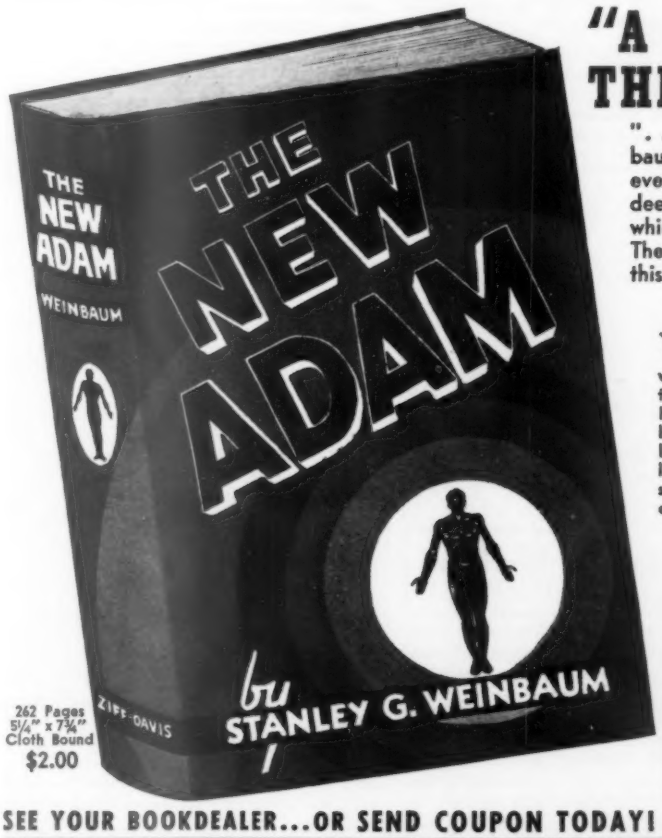

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Lake Pontchartrain was entirely too rough to try a landing. But about a mile southwest of the airport was the Industrial Canal. Sure it was—and so was a 25 mile cross-wind and a very narrow approach and landing, but it was home, so around I went again, feeling for the water. It was as dark as a closet. I made the approach long and low, dropping slowly. The landing was an anti-climax. It came off too smoothly. After that there was nothing to do but taxi up on the beach, where my friends were waiting for me.

There were some mighty interesting figures waiting for me too. Of the 81 gallons of fuel, my plane had consumed 61 gallons, and had used one quart of oil. The official record has not yet been received from Washington, and, although the actual distance flown was 1,186 miles, we expect the new record to be listed as approximately 1,120 miles. The old record of 902 miles was held by Dewey Eldred and established in January, 1939, in a Taylorcraft. Traveling at an average speed of 87.85 m.p.h., my flight took 13½ hours. I had averaged 18.5 miles per gallon, at a cost of 1.04 cents per mile. Not bad, eh?

You might think from this that I'd been through enough for one day and you'd be approximately right. Except for one thing. Somebody'd thought up a swell publicity angle, and they were waiting with a microphone from WWL at the end of the flight.

That was when I really started getting frightened.

END

Manufactured Workers

(*Continued from page* 45)

tory than the present educational system, which generally provides enough training to qualify its product for positions on the street corners, selling newspapers.

The Baltimore program is a logical step from another cooperative venture instituted two years ago by Martin and the school board. At that time, the cooperating groups started a course in blueprint reading, which is held every Saturday morning from October through May at the Baltimore Polytechnic Institute, a local technical high school of high standing nationally.

This year Martin supplied 20 instructors from his engineering and manufacturing departments. The class had an enrollment of 425, of whom 148 were seniors at the institute and 275 others were Martin employes seeking voluntarily to better themselves. Every non-employe graduate of this year's (1938-1939) course, like those who graduated last year, was given an opportunity to work at the plant.

Like Martin, the school authorities feel pretty good about the success of the second training program. Not only because they're helping their students get jobs with a future but because they are, in a very real sense, making a definite contribution to the safety of the country. It isn't far-fetched for them to say, as some have said, that their help in providing Martin with trained men to build the airplanes with which the Army Air Corps is being built up

is a cooperative gesture by Baltimore toward the Government in a time of national emergency.

They are contributing to the safety of the country, but just as important, they're arming Baltimore boys for their own fight with life—and not arming them with a sketchy knowledge of Shakespeare.

END

Airy Chat

(*Continued from page 8*)

gigantic aerial attack takes place, for years. At this stage, however, we're quite sick of all the ghost stories we've been forced to read in every newspaper and magazine. If the world is to come to an abrupt end with the first appearance of a full-fledged air armada, then we wish it would happen and be done with it.

* * *

WHILE we're heckling the war, we'd like to thank those enthused readers, on behalf of the November issue, who expressed pleasure at (1) the first color ever to be printed in the editorial pages of POPULAR AVIATION and (2) the photographs of the British, French, German and Polish warplanes. Matter of fact, the color went so well we're going to continue using it until someone yells uncle. We were a bit surprised ourselves at the rather complete set of photographs we got into that issue. Which speaks well for a most jealously guarded file of photographs we've been building up for years. Haven't had time between issues to count them, but we're currently estimating our aviation photo collection in the 2,000-3,000 bracket.

* * *

IF you've never gone along on a breakfast flight you must do so first chance you get. It's something that's liable to make you want to eat at airports regularly. You'll get more than one thrill at the sight of a sky-full of private planes settling down onto the prescribed airport. One breakfast flight here at Chicago drew 101 airplanes early one recent Sunday morning.

* * *

SAW a heartening sign of the times the other day. Out at a local airport—where they had been so snooty in the past that they almost went bankrupt—we spotted some wide-eyed youngsters and their father roaming aimlessly through the hangar amongst the planes. We saw an airport attendant head their way—to chase them out of the hangar, we thought. Instead, the airport man gave us a lasting shock; he asked the visitors if they'd like to climb inside an airplane to see what it looked like! Naturally, the little family stumbled over one another trying to get there first. That attendant earned our lasting affection by spending a good half hour showing each of his visitors everything inside one of the big cabin planes. Each one had his chance to sit at the controls. They walked out of that hangar looking as though they'd heard Gabriel blow his horn.

* * *

Aeronautically speaking, they had.

M. K.

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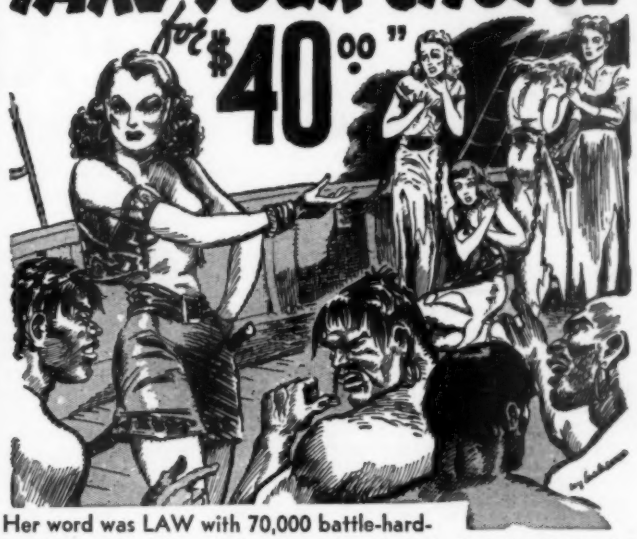

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